

# A Contribution to the Ichthyology of the Malay Peninsula

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## PLATES I-VII

The Malay Peninsula is a sort of half-way station for the marine fishes of the Indo-Pacific region. At the same time, it is the western frontier for many shore fishes of the Philippine and East Indian waters. The fresh water fishes of the Malay Peninsula are, to a very large extent, common also to Sumatra and Borneo, since all three once formed a part of Sunda Land, which now lies beneath the shallow China Sea. In addition, there are fishes hitherto unknown except in the streams of Siam and Indo China which likewise occur in the fresh waters of the Malay Peninsula. No one knows to what extent the fishes of Burma and Siam extend into the Malay Peninsula, but unquestionably a considerable number extend their range well southward toward Malacca and Johore.

Surprising as it may seem, the fish fauna of many of the Malay states is largely unknown. This is particularly true of the fresh water fishes. In 1850 Dr. Theodore Cantor published a Catalogue of Malayan Fishes, describing 292 species, mostly marine. His writings were based on collections at Penang, supplemented by visits to Malacca, Singapore, and islands on the west coast. Dr. Bleeker described a good many fishes from Singapore, but published no special account of fishes from the Malay Peninsula. In 1858 Dr. F. Jagor collected in Singapore, his fishes being reported on by Dr. Peters in 1868. In 1904 Dr. Georg Duncker published "Die Fische der Malayischen Halbinsel," based on collections made at Kuala Lumpur and elsewhere in Selangor, and in Malacca, Johore, and Singapore. He collected 300 species, of which about 100 were fresh water fishes, and lists 480 known species. Numerous other fishes were described at various times by Steindachner, Günther and Regan.

In recent years aquarium collectors have brought to light many kinds of small cyprinids from Singapore and Johore, but there has been no serious attempt to collect both widely and intensively. No one knows what the wilds of Pahang, Trengganu, Kelantan, Perak, and Kedah may contain, while I am sure that not more than half the marine and brackish water forms are yet listed.

Few regions have as attractive fresh-water fishes, or so many kinds of small, highly colored ones, as the Malay Peninsula. They occur everywhere. Some are confined to the swifter streams and hill creeks, and some to the large rivers. But many, and they the most beautiful species, are almost everywhere in the lowlands, provided it is moderately shady. The tremendous rainfall and level terrain create an infinity of creeks and brooks, supplemented in many regions by vast areas of swampy or overflowed land, while the roadside ditches abound with lovely *Rasbora*'s and other cyprinids, or *Anabantidae*. In spite of this abundance of individuals and species, it is often very difficult to get specimens, as the water may be filled with bushes, logs, tree-tops, snags, roots, grasses, and water plants, so that it is impossible to draw a seine. To make a really adequate survey of the fishes of Malaya one needs to spend at least two or three weeks in each province, and a like time in Singapore, Malacca, and Penang.

In this connection I urge the importance of making complete collections over the entire peninsula at the earliest possible date, otherwise, the next generation may find many of our fishes almost extinct. The advancing commercial development of the territory, the destruction of jungle and its conversion into plantations, the enormous development of anti-malarial measures are among the recent factors that are rapidly altering conditions and destroying the local fish fauna in many places. Years ago, tin mining ruined many streams and destroyed their fishes.

The classic locality where Duncker obtained some of his most remarkable finds, at Muar, is no more. The banks of the river have been covered with wharves extending out into deep water, the shallow inlets and pools filled, and the creeks and rivulets canalized with concrete. When I first visited Singapore, rare and beautiful endemic fishes sported in the brooks flowing through the city. To-day those same streams are mere concrete conduits. Not alone in Singapore, but over a vast area in towns, villages, and rubber plantations the brooks and rills are not only lined with concrete, but also treated with oil to destroy mosquito larvæ. It does the job effectively, but also eliminates the fishes that formerly swarmed in every water course, no matter how small.

#### A CONTRIBUTION TO MALAYAN ICHTHYOLOGY

Probably the largest and most complete collection of fishes ever obtained in Malaya was that made by David G. Stead, who was employed as Fisheries Enquiry Commissioner during 1922 and a part of 1923. This collection was taken to Australia, but apparently has never been studied or reported upon.

The present paper is the result of a visit, distressingly brief, from March 10th to March 30th, 1934. Yet, scientifically speaking, it was the pleasantest and most profitable period of comparable duration I have ever had the pleasure of experiencing. This was due to the whole-hearted co-operation and most generous hospitality of Mr. W. Birtwistle, Director of Fisheries of the Straits Settlements and Federated Malay States, who placed the resources of his department at my disposal. Without his assistance I could have done but little. This was amply supplemented by Mr. M. W. F. Tweedie, of the Raffles Museum, who supplied me with specimens not otherwise obtainable.

A good deal of material was obtained from the markets at Singapore, and various large towns elsewhere. As usual a number of species seen were altogether too large to preserve, and are therefore not listed here except in two instances. The fishes in the Singapore market come from a vast area. They are caught in the waters adjacent to Singapore, both British and Dutch, by Malay and Chinese fishermen; they also are taken by Japanese fishermen, using the "muro ami" method, up the east coast as far as the Gulf of Siam, on the west coast of Borneo, and on the coast of Sumatra. I am indebted to the Japanese for a number of species taken on the coast of Sumatra 100 miles west of Singapore.

Intensive collecting was done on various reefs fringing the outer harbour of Singapore, and in fresh and brackish water at a number of places on Singapore Island. Further collections were made along the east coast of the island and large collections were made at Pulau Ubin, which lies off the north-east shore of Singapore, by Mr. Birtwistle and staff.

An auto trip to the Mawai district, Johore, yielded many novelties, and Mr. Tweedie contributed a very interesting collection from Gunong Pulai, Johore.

Another trip by automobile through the states of Johore, Malacca, and Negri Sembilan, with stops at very many localities, gave a very fine series of fresh water fishes, while numerous marine species were collected at Muar and Malacca. Several stops were made in that region of Johore called Ayer Hitam (Malay for black water). This is a very interesting swampy region extending for many miles. The water is inky black when seen in mass, like the "black waters" of New Guinea and tropical South America. Such waters are very rich in fish life but

collecting is difficult. Trees, stumps, and litter of all kinds abound at Ayer Hitam and a cast net is the only thing one can use in a brief visit.

Mr. W. Birtwistle was my guide and companion on all extended trips and made them a success. Through him, also, a small but valuable collection of fishes was obtained from Chandra Dam, Perak River, which gave several additions to the fauna. From Mr. Tweedie came rare specimens collected by him in the mountains of Perak. Either personally, or through Mr. Birtwistle, many specimens were obtained from various localities not mentioned above.

The fresh water fishes were examined and mostly determined by me at Stanford University. Later nearly all were shipped to Washington, where I spent a week going over them with the help of Dr. George S. Myers, at the United States National Museum. He assumes joint authorship of the second part of the paper, which includes all of the fresh water fishes except a species of *Corica*, *Fluta alba*, and certain *Hemiramphidae*, *Syngnathidae*, and *Gobiidae*. Part One, containing the marine fishes, was worked up by myself. Types of all new species are in the Zoological Museum of Stanford University, and where material allows, paratypes are in the United States National Museum.

The following is a list of species that are described as new herein or were previously described from the present collection in the Bulletin of the Raffles Museum, 12, 1936, pp. 5-16. The new species are listed in capitals:—

- 1.—*Corica perakensis*, family Clupeidae.
- 2.—*LISSOCHILUS TWEEDIEI*, family Cyprinidae.
- 3.—*PANGASIUS PONDEROSUS*, family Pangasiidae.
- 4.—*Hemiramphus tweediei*, family Hemiramphidae.
- 5.—*Gobiella birtwistleai*, family Gobiidae.
- 6.—*Gnatholepis hendersoni*, family Gobiidae.
- 7.—*GNATHOLEPIS KOUMANSI*, family Gobiidae.
- 8.—*Gnatholepis mingi*, family Gobiidae.
- 9.—*Vaimosa brocki*, family Gobiidae.
- 10.—*Vaimosa mawaia*, family Gobiidae.
- 11.—*VAIMOSA SERANGOONENSIS*, family Gobiidae.
- 12.—*TAMANKA UBINENSIS*, family Gobiidae.
- 13.—*Ctenogobius opalescens*, family Gobiidae.
- 14.—*BRACHYGOBIUS XANTHOMELAS*, family Gobiidae.
- 15.—*Aboma aliceae*, family Gobiidae.
- 16.—*Smilogobius cinctus*, family Gobiidae.
- 17.—*Smilogobius singapurensis*, family Gobiidae.
- 18.—*Quisquilius malayanus*, family Gobiidae.
- 19.—*MASTACEMBELUS PERAKENSIS*, family Mastacembelidae.

A CONTRIBUTION TO MALAYAN ICHTHYOLOGY

The following species, previously described, are believed to be recorded from the Malay Peninsula for the first time. They have been described from the Philippines, Siam, Java, and other East Indian localities, Hong Kong, and Burma. Several have been known hitherto from but a single specimen or from a single collection made long ago. This addition of new species and new records is an indication of the fact that the exploration of Malayan seas and fresh waters has only begun. It is hoped that this paper may contribute to a better knowledge of our distribution of both marine and fresh water fishes in the region between the Straits of Malacca and Borneo and the Philippines.

CORICA PSEUDOPTERUS (Bleeker).  
OPHICHTHUS CELEBICUS (Bleeker).  
OPHICHTHUS EVERMANNI Jordan & Richardson.  
ARIUS LEPTONOTACANTHUS Bleeker.  
DORYICHTHYS BREVIDORSALIS (de Beaufort).  
LEUCOGLOSSUS HERKLOTSI Herre.  
APOGON COMPRESSUS (Smith & Radcliffe).  
UPENEOIDES LUZONIUS Jordan & Seale.  
PARACENTROPOGON CYANOCEPHALUS M. Weber.  
PARACENTROPOGON LEOCOPROSOPON Bleeker.  
LEPTOSYNANCEIA ASTEROBLEPA Richardson.  
DUYMERIA NEMATOPTERUS Bleeker.  
EVIOTA DISTIGMA Jordan & Seale.  
GNATHOLEPIS CALLIURUS Jordan & Seale.  
CREISSON VALIDUS Jordan & Seale.  
VAIMOSA SPILOPLEURA H. M. Smith.  
VAIMOSA PIAPENSIS Herre.  
CTENOGOBIUS BLEEKERI Day.  
CTENOGOBIUS CALDERÆ (Evermann & Seale).  
CTENOGOBIUS SCAPULO-PUNCTATUS de Beaufort.  
CTENOGOBIUS TRIANGULARIS M. Weber.  
APARRIUS ACUTIPINNIS (Cuv. & Val.).  
APARRIUS MOLOANUS Herre.  
MARS CÆRULEO-MACULATUS Herre.  
APOCRYPTODON SEALEI Herre.  
PETROSCIRTES ERETES (Jordan & Seale).  
PETROSCIRTES LOXIAS (Jordan & Seale).  
ACHIROIDES LEUCORHYNCHUS Bleeker.  
RASBORA ELEGANS Volz.  
DANIO REGINA Fowler.

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TOR TAMERA (Cuv. & Val.).  
TOR TAMBROIDES (Bleeker).  
PROBARBUS JULLIENI Sauvage.  
PUNTIUS STRIGATUS (Boulenger).  
PUNTIUS BULU (Bleeker).  
EPALZEORHYNCHUS SIAMENSIS H. M. Smith.  
ENCHELOCLARIAS TAPEINOPTERUS Bleeker.  
SILURODES HYPOPHTHALMUS (Bleeker).  
KRYPTOPTERUS MACROCEPHALUS (Bleeker).  
KRYPTOPTERUS MICRONEMA (Bleeker).  
PANGASIUS MICRONEMA Bleeker.  
GLYPTOSTERNON PLATYPOGON (Cuv. & Val.).  
MYSTUS BARAMENSIS (Regan).  
LEIOCASSIS LEIACANTHUS Weber & de Beaufort.  
PAROSPHROMENUS DEISSNERI Bleeker.

This paper lists 483 species. Of this number all but two species, too large to preserve, were placed in the University collection. The Cyprinidae supplied the greatest number of species, 62, and the gobies (*sensu lato*) came next with 53 species. Some families are very poorly represented in the collection, although they abound in Malayan waters. A longer stay at another time of year, and the use of additional collecting methods, would add to the list greatly. It is probable that Malayan waters contain more than a thousand species. A tentative check list contains about 800 species, with almost no representation of several large families.

All measurements given are of the standard length, from the snout tip to the caudal base, unless otherwise explicitly stated.

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## PART I. MARINE FISHES

By ALBERT W. C. T. HERRE, M.A., PH.D.

## Family SCYLLIORHINIDÆ.

1. *Chiloscyllium punctatum* Müller & Henle.

A young example, 90 mm. long, from Singapore.

## Family SPHYRNIDÆ.

2. *Sphyraea blochii* Cuvier.

A specimen 370 mm. long was purchased in a Singapore market. This hammer-head shark, which never reaches a large size, is commonly used as food.

## Family RHINIDÆ.

3. *Rhynchobatus djiddensis* (Forskal).

Three specimens, 300 to 345 mm. in length, from Singapore.

## Family TORPEDINIDÆ.

4. *Narcine timlei* (Bloch & Schn.).

Five examples, 89 to 126 mm. in length, from Ketam Island, Selangor. The members of this family can give a strong shock with their electric apparatus.

## Family DASYATIDÆ.

5. *Dasybatus walga* Müller & Henle.

Two embryonic specimens, 65 mm. long, from Singapore.

## Family MYLIOBATIDÆ.

6. *Aetobatus narinari* (Euphrasen).

A common food fish in the markets. Specimens seen at Singapore were too large for preservation.

## Family ELOPIDÆ.

7. *Elops hawaiiensis* Regan.

Three juvenile examples, 43 to 67 mm. in length, and two others 225 and 230 mm. long—all from Singapore.

8. *Megalops cyprinoides* (Broussonet).

Twelve specimens 93 to 186 mm. in length were taken at Pulau Ubin, near Singapore.

## Family CHIROCENTRIDÆ.

9. *Chirocentrus dorab* (Forskal).

Eight specimens were collected at Singapore, 92 to 257 mm. in length.

Family DUSSUMIERIDÆ.

10. *Dussumieria hasselti* Bleeker.

A specimen 83 mm. long is from Singapore, 1 of 68 mm. is from near Malacca, and 8 from 110 to 122 mm. in length are from Kuala Muda, Kedah.

These small silvery fishes swarm about docks and in harbours.

Family CLUPEIDÆ.

The herring family is perhaps the most important group of fishes in the East Indies.

11. *Corica perakensis* Herre.

The type and 13 paratypes, 22 to 27 mm. in length, were taken from the Perak River, Perak. Described in the Bulletin of the Raffles Museum, 12, 1936, p. 5.

12. *Corica pseudopterus* (Bleeker).

Seven specimens, 29 to 36 mm. in length, are from Singapore. New to the Malay Peninsula.

13. *Clupeoides lile* (Cuv. & Val.).

Two specimens from Singapore are 41 and 46 mm. in length.

14. *Hilsa toli* (Cuv. & Val.).

Two specimens from the Sumatra coast 100 miles west of Singapore are 55 and 67 mm. in length.

15. *Sardinella gibbosa* Bleeker.

One example 105 mm. long from Singapore.

16. *Sardinella melanura* Cuv. & Val.

Two from Singapore are 95 and 102 mm. in length.

17. *Sardinella perforata* (Cantor).

Eight from Singapore, 94 to 103 mm., and 3 from Malacca, 77 to 101 mm.

18. *Sardinella sindensis* Day.

Two examples, 122 and 123 mm. in length, from Singapore.

19. *Sardinella sirm* (Rüppell).

A specimen 144 mm. long from the coast of Trengganu.

20. *Harengula dispilonotus* Bleeker.

Four specimens, 72 to 74 mm. in length, from Singapore.

21. *Harengula fimbriata* (Cuv. & Val.).

Six examples from the Singapore market, 85 to 91 mm. in length.

22. *Ilisha hoeveni* Bleeker.

One of 46 mm. from the Sumatra coast, 100 miles west of Singapore.

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23. *Pellona ditchoa* (Cuv. & Val.).  
One of 94 mm. from Singapore.
24. *Pellona macrogaster* (Bleeker).  
From Ketam Island, Selangor, come 3 specimens, 78 to 96 mm. in length.
25. *Raconda russelliana* Gray.  
One 94 mm. long from the Sumatra coast, 100 miles west of Singapore.

Family DOROSOMATIDÆ.

26. *Anodontostoma chacunda* (Buch. Ham.).  
Eight specimens, 43 to 127 mm. length, were caught on the Sumatra coast, 100 miles west of Singapore.
27. *Nematalosa nasus* (Bloch).  
One of 92 mm. was taken at Pulau Ubin, Singapore.

Family ENGRAULIDÆ.

Anchovies occur in enormous numbers in all East Indian waters. In spite of the small size of most of them, they are valuable food fishes of considerable economic value.

28. *Setipinna breviceps* (Cantor).  
Three very fine specimens from Singapore are 260 to 280 mm. in length.
29. *Setipinna taty* (Cuv. & Val.).  
Ten specimens from Muar, Johore, are 39 to 62 mm. in length, and one of 106 mm. is from the Singapore coast, 100 miles west of Sumatra.
30. *Thrissina bælama* (Forskal).  
An example 65 mm. long was secured at Muar, Johore.
31. *Thrissocles dussumieri* (Cuv. & Val.).  
Five specimens, 79 to 98 mm. in length, were secured at Singapore, one of 80 mm. off Malacca, and one of 51 mm. at Muar, Johore.
32. *Scutengraulis hamiltoni* (Gray).  
Nine examples, 53 to 169 mm. in length, are from Singapore.
33. *Scutengraulis kammalensis* (Bleeker).  
Two specimens, 76 and 77 mm. length, are from the Sumatran coast 100 miles west of Singapore, and 2 are from Muar, Johore, their lengths 39 and 58 mm.
34. *Scutengraulis mystax* (Bloch & Schn.).  
Five examples, 91 to 139 mm. in length, are from Pulau Ubin, an islet off Singapore Island.
35. *Thrissocles setirostris* (Broussonet).  
One of 117 mm. was obtained at Singapore.

36. *Stolephorus indicus* van Hasselt.

Twenty specimens, 32 to 111 mm. length, were taken from an ambai net at Singapore. Occurs in great schools in harbours and around wharves as well as along shore.

37. *Coilia dussumieri* Cuv. & Val.

Two examples 57 and 79 mm. in length are from Muar, Johore, 2 of 87 and 116 mm. are from Pulau Ketam, Selangor, and one of 125 mm. is from the Sumatra coast 100 miles west of Singapore.

## Family NOTOPTERIDÆ.

38. *Notopterus chitala* (Buch. Ham.).

A very fine specimen 530 mm. long was secured from Chandra Dam, Perak river, Perak.

39. *Notopterus notopterus* (Pallas).

A specimen 242 mm. long was collected at Lake Chini, Pahang.

## Family SYNBRANCHIDÆ.

Peculiar eels of fresh and brackish waters mainly, occurring in south-eastern Asia and the islands adjacent thereto, and also in tropical South America.

40. *Fluta alba* (Zuiwei).

This species is very common in fresh water ponds and ditches everywhere except in the highest mountains of the Peninsula. Two examples, 210 and 244 mm. in length, were taken at Singapore and a fine one 735 mm. long was collected at Malacca. Two juvenile specimens from Gunong Pulai, Johore, are each 73 mm. long.

## Family MURÆNESOCIDÆ.

Common food fishes in the markets and reaching a length of one to two meters.

41. *Muraenesox cinereus* (Forskal).

Two specimens, 46 and 219 mm. long, from Singapore, and one of 203 mm. from the coast of Sumatra, 100 miles west of Singapore.

42. *Muraenesox talabon* (Cantor).

One of 168 mm., taken off Malacca, and one 693 mm. long from Singapore.

## Family MYRIDÆ.

The members of this group are abundant on sandy or muddy shores and under rocks; they are commonly used as food but are of no commercial importance.

43. *Muraenichthys*  
Forty sp  
248 mm. in

Abundant  
for food.

44. *Ophichthys*  
A specim

45. *Ophichthys*  
Eighteen  
735 mm. in  
Malay Penin

46. *Pisodonichthys*  
Two sp  
Singapore.

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dangerous a  
formidable a

47. *Gymnothorax*  
Eleven sp  
Singapore.

48. *Gymnothorax*  
Six exan

Mainly  
species excl  
American w

49. *Arius leptocephalus*  
A single  
market. The  
known; app  
specimen ta  
Peninsula.

50. *Arius maculatus*  
Three sp  
purchased a  
Krian, Pera

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43. *Muraenichthys macropterus* Bleeker.

Forty specimens from the tide flats about Singapore, 82 to 248 mm. in length.

Family OPHICHTHYIDÆ.

Abundant on all coasts and reefs, the larger species valued for food.

44. *Ophichthus celebicus* (Bleeker).

A specimen 108 mm. long, from Singapore.

45. *Ophichthus evermanni* Jordan & Richardson.

Eighteen examples of this handsomely marked eel, 98 to 735 mm. in length were secured at Singapore. New to the Malay Peninsula.

46. *Pisodonophis cancrivorus* (Richardson).

Two specimens, 415 and 495 mm. long were taken at Singapore.

Family MURÆNIDÆ.

The members of this genus are common on all coral reefs; some species swarm in vast numbers on the coral sands in shallow water. Certain kinds attain a very large size, and are then dangerous as they are fearless and ever ready to use their formidable armament of needle-like teeth.

47. *Gymnothorax boschi* (Bleeker).

Eleven specimens, 135 to 220 mm. long, were collected at Singapore.

48. *Gymnothorax meleagris* Shaw.

Six examples from Pulau Ubin are 340 to 400 mm. in length.

Family ARIIDÆ.

Mainly marine cat-fishes, also entering rivers, but some species exclusively fresh water; common in tropical Asiatic and American waters. Extensively eaten, but of poor quality.

49. *Arius leptonotacanthus* Bleeker.

A single specimen 172 mm. long was found in the Singapore market. The distribution of this very rare species is little known; apparently only recorded by Bleeker from a single specimen taken near Surabaya, Java. New to the Malay Peninsula.

50. *Arius maculatus* (Thunberg).

Three very good specimens, 195 to 255 mm. in length, were purchased at the market in Malacca; one from Bukit Merah, Krian, Perak, measures 106 mm.

51. *Arius sagor* (Ham. Buch.).

Two specimens of this common species, 200 and 232 mm. long, were bought at a Singapore market.

52. *Osteogeneiosus militaris* (L.).

A fine specimen 315 mm. long was purchased at the Malacca market.

Family PLOTOSIDÆ.

Marine cat-fishes swarming on every East Indian reef, much esteemed for food, but greatly dreaded by fishermen because of their venomous dorsal and pectoral spines. One or two species attain a yard in length.

53. *Paraplotosus albilabris* (Cuv. & Val.).

Ten excellent examples, 26 to 284 mm. in length, were caught on a reef in the outer harbour, Singapore.

54. *Plotosus anguillaris* (Bloch).

Five specimens, 130 to 155 mm. in length, were collected on a Singapore reef.

55. *Plotosus canius* Buch. Ham.

Nine typical examples, 130 to 189 mm. in length, were taken on a Singapore reef.

Family SYNODONTIDÆ.

56. *Saurida tumbil* (Bloch).

Twenty-five specimens, 42 to 161 mm. in length, were collected at Singapore.

57. *Saurida undosquamis* (Richardson).

An example of this species, 65 mm. long, was taken on the Malacca coast.

Family BELONIDÆ.

Predaceous fishes living along the coast but usually out in the open channel, some species reaching a meter and a half in length. Valued for food, but of little commercial importance. They are notable for their slender elongate form and greatly extended beak armed with many needle-like teeth.

58. *Tylosurus crocodilus* (Lesueur).

A specimen 182 mm. long from Selat Pau.<sup>1</sup>

59. *Tylosurus strongylurus* (van Hasselt).

One of 180 mm. from Singapore, and one 113 mm. long from the Sumatra Coast, 100 miles west of Singapore. Sometimes brought to market in considerable numbers.

1. A strait in the Rhio Archipelago.

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Family HEMIRAMPHIDÆ.

The half-beaks are recognized by having the lower jaw extended into a long beak, its tip serving as a secondary organ. Some species are common surface dwellers in fresh and brackish waters, all small and more or less solitary; others confined to salt water live in schools, are much larger, and are food fishes of more or less local importance.

60. *Hemiramphus far* (Forskal).

A specimen 161 mm. long from Selat Pau.

61. *Hemiramphus gaimardi* Cuv. and Val.

An example 93 mm. long from the Sumatra Coast 100 miles west of Singapore, and one of 118 mm. from Selat Paoe.

62. *Hemiramphus melanurus* Cuv. and Val.

Twenty-one specimens, 38 to 130 mm. long, from Lumut, the Dindings, and 5 from Singora, Siam, 118 to 148 mm. long.

63. *Hemiramphus tweediei* Herre.

The type and only specimen, 180 mm. long, taken near Singapore, has been described in the Bulletin of the Raffles Museum, 12, 1936, p. 6.

64. *Hemiramphodon pogonognathus* (Bleeker).

Five specimens were collected on Singapore island, 72 at Gunong Pulai, Johore, 1 at Ayer Hitam, Johore, 10 in the Mawai district, Johore, and 1 at Lake Chin Chin, Jasin, Malacca, their lengths 25 to 52 mm.

65. *Dermogenys orientalis* (M. Weber).

Four specimens 27 to 48 mm. in length were taken near Kuala Pilah, Negri Sembilan. Dorsal 9; anal 14; depth 5.85 times in length; eye 2.3 times in the postorbital; ventrals nearer head than caudal base.

66. *Dermogenys pusillus* van Hasselt.

Four good specimens from the Mawai district, Johore, measure 41 to 51 mm. in length.

67. *Zenarchopterus buffonis* (Cuv. & Val.).

Ten were taken on Singapore island and 7 at Pulau Ubin, 51 to 97 mm. in length.

Family EXOCETIDÆ.

Flying fishes are very abundant throughout Malaya, in all broad channels as well as bays, gulfs, and the open sea.

68. *Parexocoetus brachypterus* (Richardson).

A specimen 50 mm. long was taken at Selat Pau.

69. *Cypselurus oligolepis* (Bleeker).

Two examples were collected at Singapore, 2 at Selat Paoe, and one on the coast of Sumatra 100 miles west of Singapore, their lengths 123 to 141 mm.

## Family HOLOCENTRIDÆ.

Small or medium-sized reef fish, usually brilliant red, their colors blending with the coral. They are good eating but of no commercial importance.

70. *Holocentrus ruber* (Forskal).

A small specimen, 65 mm. long, was taken at Singapore.

71. *Holocentrus sammara* (Forskal).

A juvenile example 30 mm. long was collected at Singapore.

## Family SYNGNATHIDÆ.

The pipe-fishes and sea-horses are small and usually very slender fishes, covered with bony armor and of singular physiognomy. The eggs are incubated by the males, who carry them in a special pouch on the abdomen or under side of the tail. Most of them are marine but enter rivers and lakes, while some are only known from fresh water.

72. *Doryichthys brevidorsalis* (de Beaufort).

Two specimens of this rare species, 62 and 72 mm. in length, were collected from fresh water in the Mawai district, Johore. My specimens present some marked divergences from those of Dr. de Beaufort. New to the Malay Peninsula.

Dorsal 28; pectoral 17; caudal rings 32 to 34; trunk rings 16; subdorsal rings 1 + 6; snout equal to or a little longer than the post orbital part of the head.

The inflated operculum has a median longitudinal complete keel with radiating striæ above and below; there is no trace of a second or third keel, as given by Weber and de Beaufort. A black band extends along the side of the snout and through the eye to the hind end of the opercle; it then continues along the trunk and on the tail, and is more or less interrupted on the trunk by white spots in or just below the band; a black line extends along each side under the snout as far back as beneath the hind edge of the eye; black patches may be present on the throat. Beginning under the dorsal fin there is a white ocellus partly on the side and partly under each ring back to the caudal fin.

73. *Doryichthys deokhatoides* (Bleeker).

Two excellent specimens were secured from a fresh water creek in the Mawai District, Johore, their lengths 225 and 235 mm.

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74. *Chœrichthys brachysoma* (Bleeker).

Eighteen specimens of this widely distributed species, 43 to 57 mm. in length, were caught on Singapore reefs.

75. *Micrognathus brevirostris* (Rüppell).

Nine examples, from 45 to 55 mm. in length, were collected on a reef at Singapore.

76. *Syngnathus djarong* Bleeker.

Sixteen examples, 62 to 105 mm. in length, were collected at Singapore.

77. *Syngnathus spicifer* Rüppell.

A specimen 110 mm. long was taken at Singapore.

Family *FISTULARIIDÆ*.

Very elongate bony fishes living along shore and in open channels, of no value as food. They reach a length of 5 feet or more.

78. *Fistularia villosa* Klunzinger.

Eight young specimens, 116 to 155 mm. in length, were collected at Singapore.

Family *CENTRISCIDÆ*.

The members of this family are among the most remarkable of all fishes. They are not only of singular shape but are also covered with transparent armor, so that the air bladder becomes a clear window through which one can look. These fishes also have the extraordinary habit of swimming in a vertical position, head downward. Feeble swimming, of small size, not edible.

79. *Aeoliscus strigatus* (Günther).

A specimen 166 mm. long was collected at Singapore.

80. *Centriscus scutatus* L.

One example 94 mm. long was taken on the coast of Pahang.

Family *ATHERINIDÆ*.

These small silvery fishes occur in enormous schools along all Malayan coasts. Used as food but bony.

81. *Atherina endrachtensis* Quoy and Gaimard.

Twenty-six specimens, 44 to 69 mm. long, from Lumut, Dindings.

82. *Atherina forskali* Rüppell.

Three specimens from Malacca are from 67 to 76 mm. in length.

83. *Atherina valenciennesi* Bleeker.

Three specimens, 57 to 62 mm. in length, are from Telok Anson, Perak.

84. *Hepsetia regina* (Seale).

Very many specimens were taken at Singapore, their lengths 48 to 73 mm. Hitherto known only from the Philippines.

## Family MUGILIDÆ.

Valuable food fishes, occurring in large schools along sandy shores and in bays and estuaries. Many species spend most of their life in lakes and rivers, only returning to the sea to spawn. A few species are exclusively marine.

85. *Mugil dussumieri* Cuv. & Val.

Eight specimens from Singapore are 73 to 185 mm. in length, and one from Muar, Johore, is 69 mm. long.

86. *Mugil labiosus* Cuv. & Val.

An example 139 mm. long is from Singapore.

87. *Mugil engeli* Bleeker.

A specimen 60 mm. long is from Singapore, and 4 from Muar, Johore, are 58 to 75 mm. in length.

88. *Mugil longimanus* Günther.

Three from Pulau Ubin are 91 to 101 mm. in length.

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89. *Sphyraena forsteri* (Cuv. & Val.).

A specimen 370 mm. long came from the coast of Trengganu.

90. *Sphyraena jello* (Cuv. & Val.).

Two juvenile specimens from Singapore are 48 and 65 mm. in length.

91. *Sphyraena langsar* Bleeker.

A specimen from the Trengganu coast measures 187 mm.

## Family POLYNEMIDÆ.

Highly esteemed food fishes, some reaching a very large size.

92. *Polydactylus kuru* Bleeker.

Two examples, from the coast of Trengganu, are 129 and 133 mm. long.

93. *Polydactylus microstoma* Bleeker.

Two specimens, 84 and 136 mm. long, are from the Malacca coast.

94. *Eleutheronema tetradactylum* (Shaw).

A much valued food fish, reaching a length of 2 meters. Specimens observed in the Singapore market were too large for my containers.

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Family SCOMBRIDÆ.

The mackerels are fishes of the open sea, usually travelling in large schools, and are extensively used and highly prized for food.

95. *Rastrelliger kanagurta* (Cuvier).

Ten specimens, 163 to 183 mm. in length, are from Kuala Muda, Kedah.

96. *Scomberomorus commerson* (Lacepede).

Seven from Singapore, 56 to 132 mm.; 1 of 64 mm. from the Sumatra coast 100 miles west of Singapore; 3 from Singora, Siam, 145 to 198 mm. in length. Reaches a length of 6 feet. This valuable fish is a delight to the epicure and a joy to the angler.

97. *Scomberomorus guttatus* (Bl. & Schn.).

A young specimen of 100 mm. was taken at Singapore.

Family TRICHIURIDÆ.

98. *Trichiurus haumela* (Forskal).

A specimen 330 mm. long was bought in the Singapore market, where this fish is very abundant.

Family PAMPIDÆ.

99. *Pampus cinereus* (Bloch).

An example 91 mm. long is from Malacca.

100. *Pampus sinensis* (Euphrasen).

Four specimens from Singapore are 187 to 197 mm. in length.

Family CARANGIDÆ.

Valuable food fishes, many reaching a large size. They occur on all shores and along reefs, but certain species live in large and more or less migratory schools off shores or in open water.

101. *Decapterus russelli* (Rüppell).

Four specimens, 120 to 138 mm. in length, from Bui, Boompjes Island, Java Sea.

102. *Selar crumenophthalmus* (Bloch).

Two specimens 125 and 126 mm. in length are from Singapore.

103. *Atule djedaba* (Forskal).

A juvenile specimen 64 mm. long is from the coast of Sumatra, 100 miles west of Singapore.

104. *Atule kalla* (Cuv. & Val.).

Four examples from Singapore are 58 to 70 mm. in length.

105. *Atule malam* (Bleeker).  
A specimen 190 mm. long is from Singapore.

106. *Atule mate* (Cuv. & Val.).  
Two from Singapore are 123 and 202 mm. in length.

107. *Citula armatus* (Forskal).  
A juvenile example 58 mm. long is from Singapore and 2 others from Malacca are 34 and 51 mm.

108. *Caranx malabaricus* (Bl. & Schn.).  
Three young specimens from Singapore are 56 to 60 mm. in length.

109. *Caranx sexfasciatus* (Quoy & Gaimard).  
Four specimens 59 to 80 mm. in lengths are from Singapore.

110. *Leucoglossa herklotsi* Herre.  
Three fine specimens 125 to 141 mm. in length were taken in the Straits of Malacca, off Perak. Previously known only from the type taken at Hong Kong.

111. *Selaroides leptolepis* (Cuv. & Val.).  
Five from 84 to 102 mm. in length were taken at Singapore.

112. *Atropus atropus* (Bloch & Schneider).  
An example 137 mm. long was secured at Malacca.

113. *Alectis ciliaris* (Bloch).  
A specimen 101 mm. long was caught in the Straits of Malacca off Perak.

114. *Alectis indica* (Rüppell).  
Two specimens, 60 and 70 mm. in length, are from Malacca.

115. *Trachinotus blochi* (Lacep.).  
A juvenile example 43 mm. long is from Singapore.

116. *Scomberoides lysan*.  
A specimen 104 mm. long is from Singora, Siam.

117. *Scomberoides tollo-parah* Rüppell.  
A juvenile specimen only 32 mm. long, from Malacca belongs here.

118. *Naucrates ductor* L.  
Two examples, 137 to 182 mm. in length, are from the China Sea, off the coast of Pahang.

Family LEIognathidæ.

Common in water of moderate depth, up to 15 fathoms or more, dwelling near the bottom and readily taken by trawling. They are notable for the highly protrusible mouth. When captured they secrete an extraordinary amount of mucus, so that a pile of them is soon concealed by the accumulated slime. They

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are pan fish of fair quality but are usually too small and bony to be desirable.

119. *Leiognathus blochi* (Cuv. & Val.).

A specimen 72 mm. long is from Singapore and one of 67 mm. is from Muar, Johore.

120. *Leiognathus daura* (Cuvier).

Eight examples from Singapore are 50 to 65 mm. in length.

121. *Leiognathus dussumieri* (Cuv. & Val.).

Twelve specimens, 40 to 59 mm. in length, from Singapore.

122. *Leiognathus equula* (Forskal).

A single example from Singapore is 50 mm. long.

123. *Leiognathus ruconius* (Buch. Ham.).

Three specimens from Singapore and 4 from Malacca are 30 to 62 mm. in length.

124. *Leiognathus splendens* (Cuvier).

One specimen 58 mm. long from Singapore and 2 from Muar, Johore, each 62 mm. long.

125. *Leiognathus stercorarius* Evermann & Seale.

Six excellent specimens, 63 to 78 mm. in length, were taken at Singapore.

This distinct species has been confused by most writers with *Leiognathus elongatus* Günther, from which it is easily separated. *L. stercorarius* has 55 to 57 scales in the lateral line, and the depth is 3 in the length. In *L. elongatus* there are only 42 scales in the lateral line and the depth is 4 to 5 times in the length.

126. *Gazza minuta* (Bloch).

Six specimens were collected at Singapore, their lengths 73 to 91 mm.

Family GERRIDÆ.

Food fishes resembling the *Leiognathidae* in their highly protrusible mouths, but widely different in other respects; they are larger and of better quality also.

127. *Gerres abbreviatus* Bleeker.

An example from Singapore is 119 mm. long.

128. *Gerres macrosoma* Bleeker.

One specimen 86 mm. long is from Singapore.

129. *Gerres oblongus* (Cuv. and Val.).

Twelve specimens, 33 to 90 mm. in length were netted at Singapore.

130. *Gerres oyena* (Forskal).

Very common at Singapore, where I took 87 specimens, 18 to 118 mm. in length.

## Family KURTIDÆ.

131. *Kurtus indicus* Bloch.

Two specimens, 66 and 77 mm. long, from the Sumatra Coast, 100 miles west of Singapore. Strange little fishes of uncertain relationship and of no economic importance.

## Family APOGONIDÆ.

Typical inhabitants of coral reefs at shallow depths. There are very many species in Malayan waters, none of them of any commercial importance. I obtained only a small part of the species actually resident. After the eggs are laid the males carry them in the mouth until incubation is completed, the egg mass often projecting beyond the jaws.

132. *Apogon amboinensis* Bleeker.

A single specimen 45 mm. long was taken at Singapore.

133. *Apogon aureus* (Lacépède).

A specimen 91 mm. long was captured off the east coast of Johore.

134. *Apogon bandanensis* Bleeker.

One 62 mm. long, from Singapore.

135. *Apogon compressus* (Smith and Radcliffe).

This Philippine species is represented by 11 examples from the Singapore reefs, 64 to 89 mm. in length.

136. *Apogon halosoma* Bleeker.

Six from Singapore and 4 from Pulau Ubin, 32 to 88 mm. in length.

137. *Apogon koilomatodon* Bleeker.

Two specimens from Singapore, 86 to 106 mm. in length.

138. *Apogon margaritophorus* Bleeker.

Abundant on the Singapore reefs, where 76 were taken, 27 to 41 mm. in length.

139. *Apogon melas* Bleeker.

Common on reefs at Singapore; 10 examples 31 to 76 mm. in length.

140. *Apogon quadrifasciatus* Cuv. and Val.

Only 2 examples of this common species were taken at Singapore, their lengths 31 and 76 mm.

141. *Apogon rhodopterus* Bleeker.

Two from Singapore, 109 and 111 mm. in length.

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142. *Apogon trimaculatus* Cuv. and Val. -  
A specimen 31 mm. long from Singapore.

143. *Apogonichthys auritus* (Cuv. and Val.).  
Twenty-three specimens of this common species were taken at Singapore, 26 to 53 mm. in length.

144. *Apogonichthys perdix* (Bleeker).  
One of 47 mm. from Malacca.

145. *Archamia lineolata* (Cuv. and Val.).  
Seventeen specimens, 47 to 61 mm. in length, from Singapore and one 44 mm. long from Malacca.

146. *Cheilodipterus quinquefasciatus* (Cuv. and Val.).  
A specimen 81 mm. long from Singora, Siam.

Family AMBASSIDÆ.

Bony little fishes, more or less translucent in life, often occurring in enormous numbers in rivers and lakes. Caught in large quantities and eaten by the poor, but of very little food value.

147. *Ambassis commersoni* (Cuv. and Val.).  
One example, 72 mm. long, from Telok Anson, Perak.

148. *Ambassis gymnocephalus* (Lacépède).  
Eleven from Singapore and 16 from Pulau Ubin, 31 to 57 mm. in length, and 1 of 51 mm. from Muar, Johore.

149. *Ambassis kopsi* Bleeker.  
Thirty-two from Pulau Ubin, 11 from Telok Anson, Perak, and 14 from Singora, Siam, from 25 to 64 mm. in length.

150. *Ambassis ranga* Buch. Ham.  
Three examples 33 to 35 mm. long from Tasek Berah, Pahang.

151. *Priopis buruensis* (Bleeker).  
Three from Singapore, very many from Pulau Ubin, and 1 from Telok Anson, Perak, their lengths 35 to 63 mm.

152. *Priopis interrupta* (Bleeker).  
One 54 mm. in length, from Singapore.

Family SERRANIDÆ.

Valuable food fishes, some of them of the highest quality, and many of great beauty. They are on reefs and about rocky shores, some affording sport to anglers. Malayan waters contain many times the number of species here listed.

153. *Cromileptes altivelis* (Cuv. and Val.).  
A juvenile example 48 mm. long was secured from a Singapore tide-pool.

154. *Cephalopholis boenack* (Bloch).  
A good specimen 185 mm. long was taken at Singapore. 161

155. *Cephalopholis pachycentron* (Cuv. and Val.).  
Three specimens, 90 to 138 mm. long, were collected at Singapore. 162

156. *Epinephelus caeruleo-punctatus* (Bloch).  
Two young specimens from Singapore are 82 and 86 mm. in length. 162

157. *Epinephelus malabaricus* (Bl. and Schn.).  
A young specimen 59 mm. long was taken from a pond at Pulau Ubin. 163

158. *Promicrops lanceolatus* (Bloch).  
A small example, 113 mm. long, of this gigantic fish was taken from a Singapore tide-pool. It reaches a length of ten feet or more and is very bulky. 163

159. *Centrogenys vaigiensis* (Quoy and Gaimard).  
Common on rocky reefs. A large number was taken at Singapore, of which 23 were kept, their lengths 27 to 93 mm. 164

## Family PSEUDOCHROMIDÆ.

Small coral reef fishes of no direct economic value, most of them plain brown in color, but some brilliant red or red marked with blue. 164

160. *Pseudochromis ransonneti* Steindachner.

Of this rare species, only known from Singapore, I collected 9 specimens, 34 to 50 mm. in length, from a reef at the outer edge of Singapore harbour. It has been known heretofore only from specimens described by Steindachner in 1870. 165

Dorsal III—23; anal III—13; scales in lateral series 39 to 40; there are 27 tubulated scales in the upper row, 9 in the lower, plus 1 on the caudal base, cheeks with 4 rows of scales. The second anal spine is equal to or longer than the third spine and is twice or three times as stout. 166

The color in life is clear brownish olive, becoming yellow or greenish yellow beneath, with a yellow line from the upper angle of the pectoral to the caudal base; a second yellow line on the side of the abdomen runs parallel to the ventral profile and ends above the hind end of the anal fin or on the caudal peduncle. A very dark blue stripe extends from the eye to the tip of the snout; the fins are concolorous, the caudal broadly margined above and below with yellow, the central part of the caudal sometimes violet. 167

In alcohol the yellow fades to whitish and the yellow lines tend to disappear, as does the stripe on the snout. 168

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161. *Pseudochromis xanthochir* Bleeker.

A single specimen 36 mm. long was taken at Singapore.

Family PRIACANTHIDÆ

162. *Priacanthus tayenus* Richardson.

Three specimens, 32 to 86 mm. in length, were collected at Singapore.

Family PEMPHERIDÆ

163. *Pempheris oualanensis* (Cuv. and Val.).

Two examples, 101 and 110 mm. long, were taken on a Singapore reef.

Family LUTIANIDÆ

The snappers are valuable food fishes, living on rocky reefs at moderate depths. All are marine, but some species spend part of their life in lakes or rivers.

164. *Lutianus argentimaculatus* (Forskal).

Two young examples, 41 and 45 mm. in length, from Singapore. This species enters rivers and lakes, where it remains until sexually mature, returning to the sea to spawn. It is one of the largest snappers, reaching a weight of 25 pounds or more.

165. *Lutianus cæruleo-lineata* Rüppell.

A Singapore specimen measures 153 mm.

166. *Lutianus chrysotænia* (Bleeker).

Five specimens, 85 to 149 mm. in length from Singapore.

167. *Lutianus decussatus* (Cuv. and Val.).

Two fine examples from Singapore are 193 and 211 mm. in length.

168. *Lutianus erythropterus* Bloch.

Two specimens, 32 and 39 mm. long, from Singapore.

169. *Lutianus flavipes* (Cuv. and Val.).

A juvenile example from Singapore, 32 mm. long.

170. *Lutianus lineolatus* (Rüppell).

Three specimens, 97 and 110 mm. long, from the east coast of Johore.

171. *Lutianus malabaricus* (Bloch and Schn.).

Two specimens, 122 and 158 mm. long, from the coast of Selangor.

172. *Lutianus marginatus* (Cuv. and Val.).

A young example, 40 mm. long, from Singapore.

## Family POMADASIDÆ

Reef dwelling fishes of a medium to large size, many of them valued for food and of considerable commercial importance in the markets, both fresh and in a dried state.

173. *Casio diagramma* Bleeker.

A specimen 68 mm. long was taken in a net. Large quantities of several species of *Casio* are brought to the Singapore market by Japanese fishermen. When fresh and properly cooked they are very delicious. Through an oversight I failed to purchase examples of 4 or 5 species seen in the market.

174. *Plectorhynchus chaetodontoides* Lacépède.

A young specimen 61 mm. long was obtained on a reef in Singapore harbour.

175. *Plectorhynchus pictus* (Thunberg).

A typical example, 166 mm. long, of this common food fish was taken on the Sumatra coast, 100 miles west of Singapore.

176. *Scolopsis bilineatus* (Bloch).

Two specimens, 46 and 64 mm. long, were taken at Singapore.

177. *Scolopsis bimaculatus* (Rüppell).

One 84 mm. long was collected at Singapore.

178. *Scolopsis longulus* Richardson.

Four juvenile specimens, 20 to 23 mm. long, from the Singapore reefs belong with this species.

179. *Scolopsis monogramma* (Cuv. and Val.).

An example 96 mm. long was taken at Singapore.

180. *Scolopsis trilineatus* Kner.

Twenty-four specimens, from 58 to 87 mm. in length, were taken on a reef in Singapore harbour.

181. *Scolopsis xenochrous* Günther.

A specimen 102 mm. long was collected at Singapore.

182. *Pomadasys hasta* (Bloch).

Five specimens 42 to 95 mm. in length were obtained at Singapore.

183. *Pomadasys maculatus* (Bloch).

Common on the Singapore reefs where I collected 15 from 42 to 95 mm. in length.

## Family THERAPONIDÆ

Small perch-like shore fishes, most marine, usually abundant but of little value.

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184. *Therapon jarbua* (Forskal).

Eight specimens, 52 to 126 mm. in length, from Singapore.

185. *Therapon theraps* (Cuv. and Val.).

I have 7 examples, 34 to 49 mm. in length, from the Sumatra Coast 100 miles west of Singapore; a very fine large specimen 155 mm. long from Singapore, and one 98 mm. long from the Trengganu Coast.

186. *Datnioides polota* (Buch. Ham.).

Two specimens, 68 and 93 mm. long, from Singapore, and 7 from Telok Anson, Perak, from 58 to 95 mm. in length are in the collection.

Family LETHRINIDÆ

Important food fishes with savory flesh, some species attaining a length of nearly a meter. A dozen or more species of these reef fish occur about the Malay Peninsula.

187. *Lethrinus amboinensis* Bleeker.

Two young specimens, 78 and 87 mm. in length, were taken on a reef in Singapore harbour.

Family SPARIDÆ

A large group of food fishes, often brilliant red or rose color, or with rosy or yellow stripes; some sparoids are of great economic importance.

188. *Pentapus caninus* (Cuv. & Val.).

Eighteen specimens, 43 to 112 mm. long, are from reefs at Singapore, and one of 75 mm. was taken on the east coast of Johore.

189. *Synagris mesoprion* (Bleeker).

An example 108 mm. long was collected on the Sumatra coast 100 miles west of Singapore.

190. *Gymnocranius griseus* (Schlegel).

A specimen 77 mm. long was caught on the east coast of Johore.

Family INERMIDÆ

191. *Dipterygonatus leucogrammicus* Bleeker.

Six examples of this little fish of sandy shores were taken on the Johore coast, their length 70 to 81 mm.

Family MULLIDÆ

Fishes with 2 long firm barbels under the chin, which they keep moving constantly as they search the sea bottom for food. Usually brightly colored shore or reef fishes, found in all warm seas and highly valued for food. Fifteen or more species inhabit Malayan waters.

192. *Upeneoides luzonius* Jordan & Seale.

A juvenile but unmistakable example of this species was taken at Singapore. Previously known only from the Philippines.

193. *Upeneoides sulphureus* (Cuv. & Val.).

Of this common species the following were collected:—5 from Muar, Johore, 58 to 67 mm. in length; 23 from Singapore, 45 to 57 mm. in length; 2 from the Sumatra coast 100 miles west of Singapore, 40 and 50 mm. long; 4 from Malacca, 59 to 66 mm. in length; and 4 from Telok Anson, 45 to 57 mm. in length.

194. *Upeneoides tragula* Richardson.

Four specimens were secured at Singapore, their lengths 65 to 80 mm.

## Family SCIENIDÆ

An important family of food fishes, some of them reaching a very large size. Oriental waters abound in species which are in a lamentable state of confusion. Dried, preserved in alcohol or formalin, or in the markets they are silvery, but in life many are brilliant orange or brassy yellow.

195. *Umbrina dussumieri* (Cuv. & Val.).

The collection contains one of 154 mm. from Pinang Pangkor Island, Perak.

196. *Johnius aeneus* (Bloch).

Two specimens, 91 and 102 mm. in length, were purchased at the Singapore market.

197. *Johnius belengeri* (Cuv. & Val.).

Two specimens purchased in Singapore are 117 and 125 mm. in length, and one from the Sumatra coast is 91 mm. long.

198. *Johnius coibor* (Buch. Ham.).

Four examples, 95 to 98 mm. in length, were taken at Singapore.

199. *Johnius diacanthus* (Lac.).

A young specimen 48 mm. long was taken in a net at Singapore.

200. *Johnius osseus* (Day).

A specimen 97 mm. long was taken on the coast of Sumatra 100 miles west of Singapore.

201. *Johnius sina* (Cuv. & Val.).

An example 132 mm. long was purchased at the Singapore market.

202. *Otolithes argenteus* Cuv. & Val.

A fine specimen 172 mm. long was obtained from Penang.

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203. *Otolithoides microdon* Bleeker.

An excellent example 198 mm. long was purchased in the Malacca market; another 151 mm. long is from Singora, Siam. Dorsal IX-1-36; anal II-7; scales in lateral line 54; longitudinal series just above lateral line 93; scales between lateral line and dorsal origin 12.

204. *Otolithoides brunneus* (Day).

A very fine specimen 278 mm. long was bought at the Malacca market.

205. *Pama pama* (Buch. Ham.).

Specimens were obtained as follows:—6 at Muar, Johore, 43 to 56 mm. in length; 6 at Bagan Datoh, mouth of the Perak river, 81 to 134 mm. in length; 5 at Telok Anson, Perak, 118 to 155 mm. in length.

Family SILLAGINIDÆ

These are slender silvery fishes reaching a foot or more in length, and common on Asiatic coasts from Japan through the East Indies and Malaya to India. In many places they are much esteemed for food.

206. *Sillago maculata* Quoy & Gaimard.

Ten specimens, 34 to 75 mm. in length, were taken from an ambai net at Singapore.

207. *Sillago sihama* (Forskal).

This is the commonest species; 6 specimens collected at Singapore are from 73 to 118 mm. in length.

Family DREPANIDÆ

Very deep bodied and laterally compressed fishes, commonly caught in fish corrals. They are extensively used as food, both fresh and dried.

208. *Drepene longimana* (Bl. & Schn.).

Four young specimens from Singapore, and 3 more young ones from Pulau Ketam, Selangor, 45 to 57 mm. long.

209. *Drepene punctata* (L.).

Two examples, 61 and 101 mm. long, from Johore Bahru.

Family TOXOTIDÆ

The archer-fishes have the astonishing habit of shooting drops of water at resting insects, thus capturing them. Small fishes living in both salt and fresh water, in bays, mangrove swamps, estuaries, rivers and lakes.

210. *Toxotes chatareus* (Buch. Ham.).

Three specimens, 47 to 75 mm. in length, taken at Telok Anson, Perak.

211. *Toxotes jaculator* (Pallas).

Two were taken at Singapore, 38 and 76 mm. long.

## Family SCATOPHAGIDÆ

212. *Scatophagus argus* (Boddært).

Seven specimens, 49 to 66 mm. in length, from Singapore and Pulau Ubin, and one of 64 mm. from Telok Anson, Perak. Common in bays and harbors, and entering rivers and lakes. A good food fish, but often rejected as it is a scavenger around human habitations.

## Family CHÆTODONTIDÆ

The butterfly fishes are typical of coral reefs and are among the loveliest of all animals, rivalling butterflies in their glowing brilliance.

213. *Chætodon octofasciatus* Bloch.

Seven specimens, 47 to 72 mm. long, were taken at Singapore.

214. *Chelmon rostratus* (L.).

Six examples from a reef at Singapore, their lengths 40 to 102 mm.

215. *Coradion chrysozonus* (Cuv. & Val.).

Two fine specimens, 100 and 110 mm. long, from a reef near Singapore.

216. *Parachætodon ocellatus* (Cuv. & Val.).

A small specimen from Singapore is 49 mm. long.

217. *Holacanthus annularis* (Bloch).

An example 117 mm. long was captured at Singapore.

218. *Holacanthus mesoleucus* Bleeker.

Four specimens, 70 to 87 mm. in length, from Singapore.

## Family ACANTHURIDÆ

The surgeon-fishes are mostly plain brown herbivorous fishes, living in schools about reefs, and armed with a needle or knife on either side of the caudal peduncle. They are excellent when properly cooked and are brought to the Singapore market at certain seasons in very large numbers by the Japanese fishermen.

219. *Acanthurus triostegus* (L.).

A juvenile specimen, 31 mm. long, of this wide-spread species was collected at Singapore.

## Family SIGANIDÆ

Herbivorous fishes of rocky reefs, living in schools. They are excellent eating and are taken by the Japanese fishermen in large quantities.

A CONTRIBUTION TO MALAYAN ICHTHYOLOGY

220. *Teuthis hexagonata* (Bleeker).

A young specimen 44 mm. long was caught on a Singapore reef.

221. *Teuthis oramin* (Bl. & Schn.).

This species is very common in shallow water about Singapore, where I collected 16, from 23 to 131 mm. in length.

222. *Teuthis tetrazona* (Bleeker).

Two examples, 27 and 31 mm. in length, were taken at Singapore.

223. *Teuthis virgata* (Cuv. & Val.).

Three specimens of this very handsome fish, 117 to 152 mm. long, were collected on a Singapore reef.

Family SCORPÆNDÆ

A large family of small to medium-sized fishes, most of them armed with numerous venomous spines on the head, with which these "stinging fish" inflict very painful wounds. A number of species have poison glands connected with the dorsal spines and a full charge of their venom causes not only agonizing pain, but the loss of a foot or even death in from one to four hours. Many simulate the coral and rocks amid which they live, but some of the free swimming forms are as beautiful as they are terrible. They know their power and fear nothing; when disturbed they strut like an angry turkey-gobbler. Well known and greatly feared by fishermen, the larger scorpænids are all desirable food fishes after the dorsal spines are removed.

224. *Scorpænodes guamensis* (Quoy & Gaimard).

Eight from Singapore reefs, 22 to 79 mm. in length.

225. *Sebastapistes tristis* Klunzinger.

A single example 78 mm. long was taken at Singapore.

226. *Vespicula trachinoides* (Cuv. & Val.).

Three specimens, 35 to 53 mm. in length, from the coast of Sumatra, 100 miles west of Singapore.

227. *Paracentropogon cyanocephalus* M. Weber.

A fine specimen of this very rare little fish was taken on a reef at Singapore, its length 42 mm. New to Singapore and previously known only from specimens taken by the Siboga expedition in Molo Strait and the Sea of Flores, Dutch East Indies. My specimen is a facsimile of Dr. Weber's figure.

228. *Paracentropogon leucoprosopon* Bleeker.

Three examples, 9, 10, and 42 mm. in length, from Singapore. New to the Malay Peninsula.

229. *Paracentropogon longispinis* (Cuv. & Val.).

Common on Singapore reefs, where I took 12, from 21 to 50 mm. in length.

230. *Minous monodactylus* Cuv. & Val.  
Two small examples, 62 mm. long, are from Singapore.

231. *Synanceia verrucosa* (Bl. & Schn.).  
Six fine typical examples of this very dangerous fish, 74 to 143 mm. in length, were obtained on reefs at Singapore.

232. *Leptosynanceia asteroblepa* Richardson.  
A small example of this very rare scorpaenid, 51 mm. long, was secured from the Sumatra coast 100 miles west of Singapore. Previously known only from New Guinea and rivers in Borneo. Dorsal XVI-5; anal III-6; teeth on the vomer and palatines.  
The color in alcohol is dirty blackish gray, merging into black on the back; the dorsal is black, the spines and rays with conspicuous white tips; the anal, and ventrals are black; the pectorals are dark gray with rows of black spots and a dusky margin; the caudal is like the body.

233. *Polycaulis uranoscopus* (Bl. & Schn.).  
Two specimens, 20 and 57 mm. long, were taken at Singapore.

Family PLATYCEPHALIDÆ

Bottom dwellers, especially in sandy bays, the flat head usually armed with many spines, and wide mouth justifying the native name in many languages of "crocodile fish." Several species reach a length of one to two feet, and are good food fish. Where trawling is practised they are of local economic importance.

234. *Coccius crocodilus* (Tilesius).  
Three small specimens from Singapore are 63 to 78 mm. long.

235. *Platycephalus bosschei* Bleeker.  
Three good examples, 92 to 247 mm. long, are from Singapore.

236. *Platycephalus malabaricus* Cuv. & Val.  
One 88 mm. long was taken at Singapore.

237. *Platycephalus indicus* (L.).  
Two examples of this common market fish, 126 and 240 mm. in length, were collected at Singapore.

238. *Thysanophrys nematophthalmus* (Günther).  
Abundant on reefs about Singapore where I secured 36 fine typical specimens, 75 to 230 mm. length.

Family POMACENTRIDÆ

A large family of small, often very beautiful, fishes characteristic of tropical reefs, often excessively abundant amid the corals.

A CONTRIBUTION TO MALAYAN ICHTHYOLOGY

239. *Amphiprion percula* (Lacépède).

Three specimens of this lovely little fish, 55 to 58 mm. long, were taken on a Singapore reef. This exquisite creature has the strange habit of making its home within the body cavity of a large sea-anemone. To this abode it retreats whenever alarmed.

240. *Chromis analis* (Cuv. & Val.).

Six examples, 60 to 85 mm. in length, were obtained from Singapore reefs.

241. *Chromis cinerascens* (Cuv. & Val.).

Six specimens, 71 to 82 mm. in length, were collected at Singapore.

242. *Abudefduf anabatoides* Bleeker.

Four specimens, 44 to 70 mm. in length, were taken at Singapore.

243. *Abudefduf bengalensis* (Bloch).

Fifteen of this common Indian species were secured on the Singapore reefs, 30 to 45 mm. in length.

244. *Abudefduf brownriggi* (Bennett).

Only one specimen, 42 mm. long, of this very common species was collected at Singapore.

245. *Pomacentrus amboinensis* Bleeker.

Only one specimen, 59 mm. long, was taken at Singapore.

245. *Pomacentrus chrysopæcius* Schlegel & Müller.

Common on the Singapore reefs, where I took 22, their lengths 39 to 118 mm.

247. *Pomacentrus fasciatus* Cuv. & Val.

One of the most abundant on Singapore reefs, where 34 were obtained, 42 to 98 mm. in length.

248. *Pomacentrus littoralis* Cuv. & Val.

Fourteen examples, 60 to 85 mm. long, were taken on Singapore reefs.

249. *Pomacentrus melanopterus* Bleeker.

I have a single specimen, 115 mm. long, from Singapore.

250. *Pomacentrus notophthalmus* Bleeker.

Seven specimens, 30 to 39 mm. long, came from reefs at Singapore.

251. *Pomacentrus prosopotaenia* Bleeker.

Sixteen examples, 21 to 83 mm. in length, were obtained from Singapore reefs.

252. *Pomacentrus tæniurus* Bleeker.

Four specimens, 40 to 46 mm. in length, were collected at Singapore.

253. *Pomacentrus tripunctatus* Cuv. & Val.

Eleven specimens, 35 to 60 mm. in length, of this abundant species were taken from reefs at Singapore.

254. *Pomacentrus violascens* Bleeker.

Fourteen examples of this East Indian species, 35 to 46 mm. in length, were collected on Singapore reefs.

Family LABRIDÆ

A very large family of coral reef dwellers, many of them among the loveliest of living animals. Mostly of small size and not of much importance as food in Malaya, though one species *Cheilinus undulatus* reaches a length of at least 6 feet and a weight of 150 pounds or more. I obtained but a small part of the species present in this region.

255. *Cheilinus chlorurus* (Bloch).

A specimen 58 mm. long from Singapore.

256. *Cheilinus fasciatus* (Bloch).

One of 165 mm. from Singapore.

257. *Chœodon anchorago* (Bloch).

One of the commonest coral reef fishes; 33 specimens, 34 to 96 mm. long were taken on the Singapore reefs.

258. *Chœodon oligacanthus* (Bleeker).

An example 73 mm. long from Singapore and 1 of 48 mm. from Malacca.

259. *Duymeria enneacanthus* Bleeker.

Eight specimens, 45 to 63 mm. in length, from reefs in Singapore harbour.

260. *Duymeria nematopterus* Bleeker.

Three examples of this very rare labrid were secured on a reef at Singapore, 70 to 83 mm. in length. Bleeker had but one poor specimen, 110 mm. long, from Banda Neira.

The anal spines have greatly prolonged thread-like tips, more conspicuous than the elongated dorsal tips. Bleeker's figure does not show the color markings. In life the color was largely green, more or less suffused with rose on the sides and below, with large spots and cross bars of blackish.

261. *Halichoeres bicolor* (Bl. & Schn.).

Thirty-five specimens, 49 to 76 mm. long, from Singapore, where it is abundant on the reefs.

262. *Halichoeres binotopsis* Bleeker.

At Singapore I obtained one 42 mm. long.

263. *Halichoeres chloropterus* (Bloch).

Fifteen were taken at Singapore, 90 to 116 mm. in length.

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264. *Halichoeres gymnocephalus* (Bl. & Schn.).  
Seventy of this common fish, 30 to 99 mm. long, were taken at Singapore.

265. *Halichoeres hyrtli* Bleeker.  
Eighty-two of this abundant species were secured at Singapore, 32 to 59 mm. in length.

266. *Halichoeres javanicus* Bleeker.  
Three examples, 55 to 84 mm. in length, from Singapore.

267. *Halichoeres nigrescens* Bleeker.  
Four were taken at Singapore, 77 to 103 mm. in length.

268. *Halichoeres papilionaceus* (Cuv. & Val.).  
One of 75 mm., from Singapore.

269. *Halichoeres reichei* Bleeker.  
Three specimens from Singapore measure 44 to 54 mm.

270. *Hemigymnus melapterus* (Bloch).  
A juvenile specimen 33 mm. long, from Singapore.

271. *Stethojulis renardi* (Bleeker).  
Two were obtained at Singapore, 61 and 99 mm. long.

272. *Stethojulis strigiventer* (Bennett).  
Two examples, 64 and 85 mm. long, from Singapore.

SCARIDÆ

Brilliantly colored fishes of coral reefs, of little economic value but usually conspicuous in the markets of tropical seaports. Some of them attain a very large size.

273. *Scarus dussumieri* (Cuv. & Val.).  
A small specimen, 57 mm. long, was taken at Singapore.

Order GOBIOIDEA

The chief families of this group are the Eleotridae and the very closely related family following it, the Gobiidae. In East Indian and Malayan waters they occur in a vast and bewildering variety of species, every collection adding to the number known.

They are nearly all small to very small, obscure little fishes. A very few kinds reach a length of a foot or two, and several species are the smallest of living vertebrates. Most of them are marine, but a number of kinds enter fresh water and a few species spend their whole life in lakes or rivers. Most of those found in rivers return to the sea to spawn. Their fry enter the river mouths in enormous shoals, giving rise to important fisheries. The adults of a few species are caught in considerable quantities and are seen in markets throughout Malaya. Four families belonging to this order are represented in this collection, viz., Eleotridae, Gobiidae, Periophthalmidae, and Gobiodidae.

Family ELEOTRIDÆ

274. *Asterropteryx semipunctatus* (Ruppell).

Only one specimen of this wide-spread species was taken at Singapore, 28 mm. long.

275. *Eleotris melanosoma* Bleeker.

A single example, 50 mm. long, was taken at Singapore.

276. *Bostrichthys sinensis* (Lacépède).

A specimen 95 mm. long was caught at Singapore.

277. *Butis butis* (Buch. Ham.).

Eighteen specimens were taken at Singapore, 1 at Pulau Ubin, and 5 at Telok Anson, Perak, their lengths 42 to 93 mm.

278. *Prionobutis koiromatodon* Bleeker.

A specimen 49 mm. long was taken at Pulau Ubin.

279. *Oxyeleotris marmorata* (Bleeker).

Seven specimens, 32 to 138 mm. in length, from the outlet of Lake Chin Chin, near Jasin, Malacca, seem to be this species. They are very close to the typical form, but apparently differ in scalation and color markings. Dorsal VI-I-9; anal I-8; there are about 80 scales in a longitudinal, 26 in a transverse series; predorsal scales about 65. The lower part of the cheeks is scaled, while *O. marmorata* is supposed to have naked cheeks.

280. *Ophiocara porocephala* (Cuv. & Val.).

Twenty specimens from 35 to 134 mm. in length were captured on reefs at Singapore.

281. *Eviota distigma* Jordan & Seale.

A typical example 19 mm. long was taken on a Singapore reef.

282. *Valenciennea muralis* (Quoy & Gaimard).

This handsome eleotrid is common on the reefs near Singapore, where I caught 32 fine typical examples 64 to 96 mm. in length.

Family GOBIIDÆ

283. *Gobius ornatus* Ruppell.

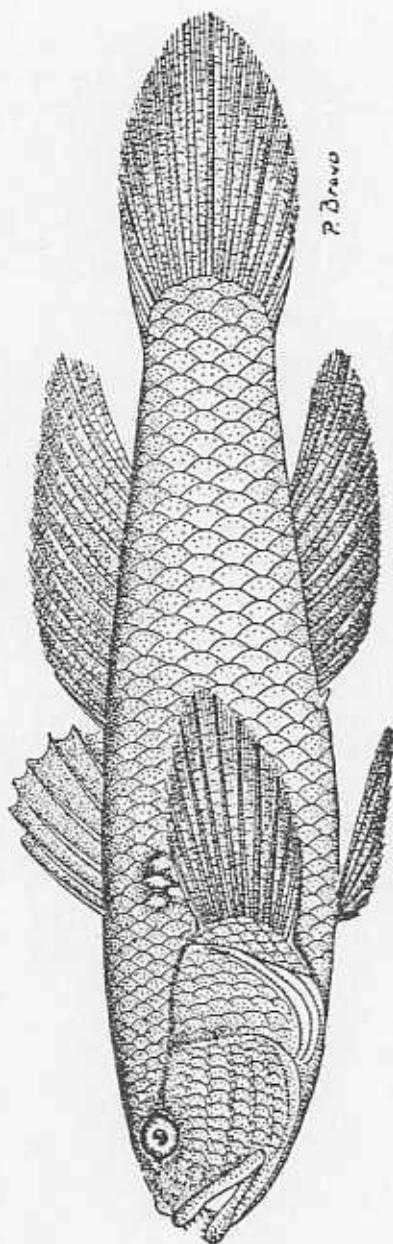
A single specimen, 46 mm. long, was obtained at Singapore.

284. *Gobius sadanundio* Buch. Ham.

This handsome little goby is common at Pulau Ubin, where 29 examples were taken, their lengths 24 to 55 mm.

285. *Bathygobius fuscus* (Ruppell).

This is the most widespread of all gobies, being found on almost all tropical coasts. 4 small examples, 23 to 30 mm. in length, were collected at Singapore.



*Gnatholepis koumansi* n.sp. (Length of type 62 mm.).

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286. *Gnatholepis calliurus* Jordan & Seale.

A single specimen of this Philippine species was caught at Singapore, its length 63 mm. New to the Malay Peninsula.

287. *Gnatholepis hendersoni* Herre.

The type and 5 paratypes, 35 to 45 mm. in length, were taken at Singapore. Previously described in the Bulletin of the Raffles Museum, 12, 1936, p. 7.

288. *Gnatholepis koumansi* new species. (Plate I).

Dorsal VI-I-10; anal I-9; scales in lateral series 28, plus 2 on the caudal base; 10 scales in transverse series and 16 predorsal; branchiostegals 5.

The robust body is laterally compressed, the head large, broad, with full cheeks; the dorsal profile is very little elevated, the ventral profile moderately convex.

The depth is 3.875 times, the head 3.26, the caudal 3.1, the pectoral 3.64, and the ventral 4.4 times in the length; the breadth of the head is 1.2 times in its own length, but the throat is so inflated that in life the breadth is probably appreciably less. The noticeably small eye is in the anterior half of the head, 6.33 times in the head, 1.66 in the snout, and 1.33 times in the interorbital. The snout is 3.8 times in the head, the eye and snout together 2.375 times; the interorbital is 4.75 times, the least depth of the caudal peduncle 2 and one-ninth times in the head. The mouth is nearly vertical, with projecting lower jaw, the angle of the maxillary beneath the front rim of the eye, the maxillary 2.45 times in the head. The teeth are in 3 or 4 rows in each jaw, the outer row enlarged, with a pair of small canines on each side of the front of the mouth in the upper jaw and a pair of large canines outside them on each side of the lower jaw, the latter fully exposed when the mouth is closed; the tongue is truncate.

The preopercle has 6 rows of scales, those below the eye smaller than the others, with a line of sensory papillæ between each row of scales; the opercle also has 6 rows of scales.

The dorsals are very close together, the first dorsal low, its third spine 2.375 in the head; the penultimate dorsal ray extends to the caudal base, 1.9 times in the head; the penultimate anal ray is 1.7 in the head; the anal base is 1.4 times in the second dorsal base; the ventral does not reach the anus; the pointed anal papilla is small.

In life the color is pale yellow, sprinkled with minute dark specks; above the pectoral is a large black spot covering 6 or 8 scales, each scale bearing a pearl colored spot; over the nape is a narrow black stripe connecting the spots on the two sides; the caudal is dusky, the other fins all black. In alcohol the

color has faded to yellowish gray and the pearly lustre has gone from the scales in the shoulder spot.

Described from the type and sole specimen, 62 mm. long, taken on a reef in the Straits of Malacca.

I dedicate this species to Dr. F. P. KOUMANS in recognition of his work on the gobies of the East Indies.

289. *Gnatholepis mingi* Herre.

The type and only specimen was taken at Pulau Ubin.

Described in the Bulletin of the Raffles Museum, 12, 1936, p. 8.

290. *Gnatholepis puntangoides* (Bleeker).

Six specimens, 86 to 101 mm. in length, were collected on the Singapore reefs.

291. *Creisson validus* Jordan & Seale.

Five examples of this Philippine species, 40 to 55 mm. in length, were collected on a reef at Singapore. New to the Malay Peninsula.

292. *Vaimosa brocki* Herre.

The type and only specimen, 28 mm. long, was caught on a Singapore reef. Described in the Bulletin of the Raffles Museum, 12, 1936, p. 9.

293. *Vaimosa mawaia* Herre.

The type and sole specimen, 24 mm. long, was taken from a roadside ditch in the Mawai District, Johore. Described in the Bulletin of the Raffles Museum, 12, 1936, p. 9.

294. *Vaimosa piapensis* Herre.

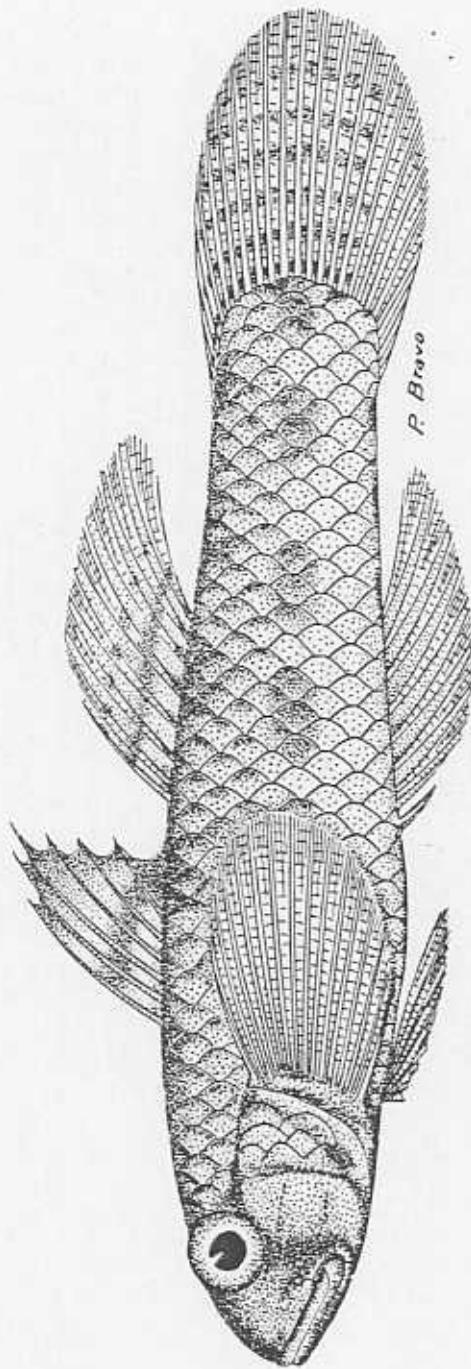
This Philippine species is now reported for the first time outside the Islands. Nine typical examples, 22 to 34 mm. in length, were caught on reefs at Singapore and Pulau Ubin. New to the Malay Peninsula.

295. *Vaimosa serangoonensis* new species. (Plate II).

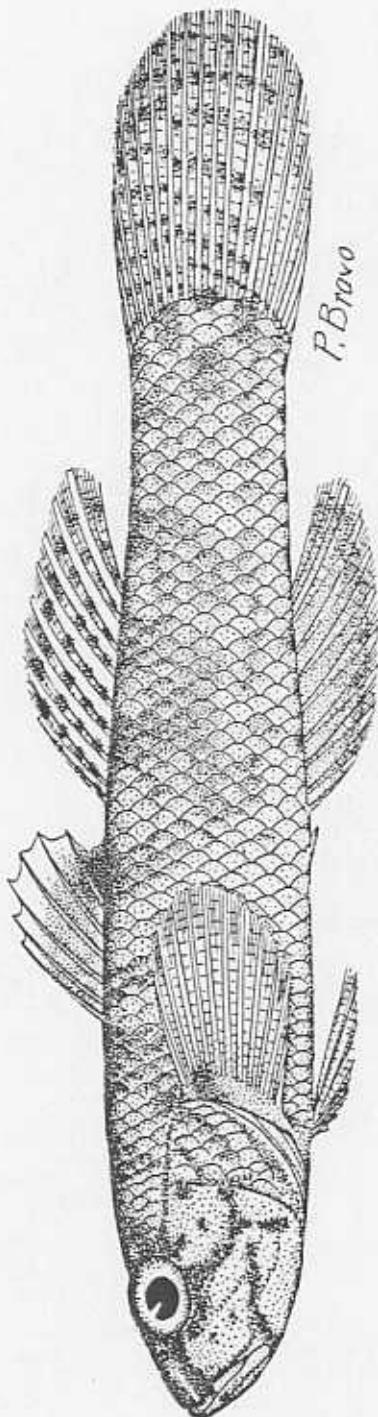
Dorsal VI-I-7; anal 1-7; scales in longitudinal series 24 or 25, plus 2 or 3 on caudal base; scales in transverse series 10; predorsal 7.

The depth is 4.5 to 4.66 times, the head 3.75 to 4, the caudal 3 to 3.11, the pectoral 3.85 to 4 times in the length. The snout equals the eye, which is 3.5 to 3.6 times in the head. The interorbital is twice in the eye; the least depth of the caudal peduncle is 1.63 to 1.8 times in the head.

The stout plump body is wedge-shaped when seen from above; the breadth of the head is six-sevenths of its own length; the dorsal and central profiles are very slightly arched. The broad blunt snout is a little protuberant, the mouth terminal or



*Vainosa serangoonensis* n.sp. (Length of type 28 mm.).



*Tamanka ubinensis* n.sp. (Length of type 29 mm.).

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somewhat inferior, the maxillary extending beneath the middle of the eye; the minute teeth are in a band of 3 rows in each jaw; the circular eye is high up, flush with the dorsal profile; the tip of the thick tongue is slightly rounded; opercle with 6 or 7 scales; 2 longitudinal rows of sensory papillæ on the preopercle, a vertical row and a very short cross row on the opercle.

The vertical fins are of moderate height, longest ray of first dorsal reaching the origin of second dorsal or extending to base of the second ray when depressed, 1.3 to 1.4 times in the head; the second dorsal height equals that of first dorsal; the anal height is 1.5 times in the head; the second dorsal and anal fall far short of the caudal base when depressed; the short rounded ventrals 5 to 6.75 times in the length; caudal very broad and rounded; the anal papilla is slender, flattened, and elongate.

The color in alcohol is pale yellowish, the upper half freckled with reddish brown spots which form 5 vaguely defined cross-bands; many scales are outlined by a dark brown stripe; along the middle of the side is a longitudinal row of 4 poorly defined elongated dark brown blotches, and a small spot at the caudal base; a dark brown bar extends from the eye diagonally downward across the cheek; interorbital space and snout dull dusky; the first dorsal has a median dark brown cross band, with a white band below and above it, and a second dark brown band across the upper part; the second dorsal has cross bands of dark spots alternating with white stripes; the caudal has 6 transverse rows of dark spots; pectorals clear, anal and ventrals dusky.

Described from the type, 28 mm. long, and paratype 27 mm. long, from a creek at Serangoon, Singapore Island. A third specimen about 18 mm. long has not assumed adult characters.

296. *Vaimosa spilopleura* H. M. Smith.

A typical example, 28 mm. long, from a tributary of Muar River, near Kuala Pilah, Negri Sembilan, agrees in every way. Previously known only from Siam.

297. *Tamanka ubinensis* new species. (Plate III).

Dorsal VI-I-8; anal I-8; there are 36 scales in a longitudinal series, plus 2 on the caudal base; transverse series 14; predorsal scales 22; opercular scales 18.

The depth is 5.25, the head and broadly rounded caudal each 3.2, the pectoral 5.25, the ventral 6.4 times in the length. The eye equals the snout, 4 times in the head, least depth of the caudal peduncle twice.

The dorsal and ventral profiles of the moderately plump body are nearly horizontal. The cheeks are full, the breadth of the head 1.5 in its length, the depth 1.8 times. The snout and chin are both convex, the chin very slightly projecting. The mouth

is oblique, the maxillary extending beneath the front margin of the eye; the minute teeth are typical of the genus; the anterior nostrils are conspicuous tubules, hanging down on the upper lip; the eye is very high up, projecting above the dorsal profile, in the forward half of the head, the interorbital space 2.2 times in the eye; the scales are as in other members of the genus; two longitudinal rows of sensory papillæ cross the preopercle, with another along its lower margin; the opercle has a vertical row anteriorly, and two transverse rows. The broad pectoral extends a little beyond the short wide ventrals, which fall far short of the anus. The vertical fins are all low, the first dorsal not reaching the second when depressed, and the second dorsal and anal not reaching the caudal by the width of 5 scales. The longest dorsal spine and ray 2.25 times in the head, the posterior anal rays twice.

In alcohol the ground color is uniform light brown, with 8 poorly defined darker brown transverse stripes over the back, 2 before and 2 under the first dorsal, 3 under the second dorsal, and one on the caudal peduncle; along the sides of the trunk are many dark brown spots irregularly arranged, often forming curved bars, and 2 conspicuous spots on the caudal base; a dark brown stripe from the eye to the upper lip, another from the eye diagonally across the preopercle, and a third curved one on the lower part of the cheek below the eye; brown flecks over the opercle and nape. The first dorsal is whitish, flecked with blackish brown anteriorly and above, and with a white margined, black ocellus on the posterior part; the second dorsal is cross-barred by 4 rows of dark brown spots; the caudal is handsomely barred by many rows of dark brown spots on its upper three-fourths, its lower portion clear; the pectoral is clear, the other fins more or less dusky.

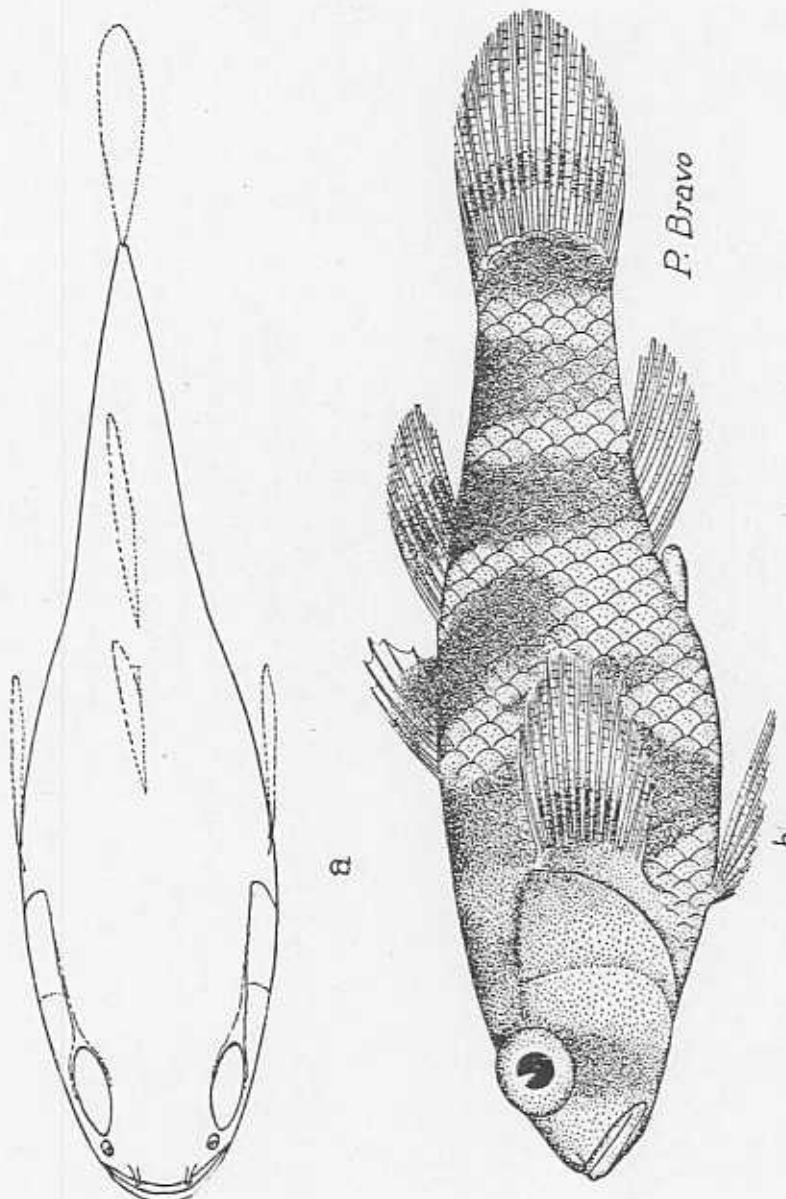
Described from the type and only specimen, 29 mm. long, collected at Pulau Ubin or Ubin Island, a small isle in the channel between Singapore and Johore. It was taken with a number of specimens of *Vaimosa piapensis* Herre; no doubt further search would show it to be not rare.

298. *Glossogobius biocellatus* (Cuv. & Val.).

Two examples, 47 and 75 mm. long, were caught on a Singapore reef.

299. *Glossogobius giurus* (Buch. Ham.).

An important food fish, widely distributed in both fresh and salt water; it reaches a length of nearly a third of a meter. Specimens were retained as follows: 1 from Singapore, 37 mm.; 3 from the coast of Sumatra 100 miles west of Singapore, 68 to 72 mm. in length; 4 from Telok Anson, 61 to 79 mm. in length;



Brachygobius xanthomelas n.sp. (Length of type 17.5 mm.).

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one from Bukit Merah, Perak, 182 mm. long; and one from Chandra Dam, Perak, of 218 mm.

300. *Ctenogobius baliuroides* (Bleeker).

Two specimens, 45 and 61 mm. in length, agree with Philippine examples and with Bleeker's original description.

301. *Ctenogobius bleekeri* Day.

Eleven excellent examples of this Indian species, 31 to 44 mm. in length, were secured on a reef at Singapore.

Dorsal VI-I-10; anal I-8; scales in longitudinal series 30, in transverse series 11.

302. *Ctenogobius calderæ* (Evermann & Seale).

This species, hitherto known only from the Philippines, where it is apparently very rare, is abundant on reefs in Singapore harbour, where I collected 70 typical specimens, 22 to 42 mm. in length.

303. *Ctenogobius caninus* (Cuv. & Val.).

Eight specimens of this common species, 66 to 83 mm. in length, were taken at Singapore.

304. *Ctenogobius criniger* (Cuv. & Val.).

This handsome species is represented by 3 examples, 63 to 65 mm. in length, from a reef in Singapore Harbour.

305. *Ctenogobius opalescens* Herre.

The type and 34 paratypes, 19 to 39 mm. in length, taken at Singapore, were described in the Bulletin of the Raffles Museum, 12, 1936, p. 15.

306. *Ctenogobius scapulo-punctatus* De Beaufort.

A single example of this rare goby, 24 mm. long, was taken at Singapore. New to the Malay Peninsula.

307. *Ctenogobius triangularis* M. Weber.

A specimen of this rare goby, 24 mm. long, was collected at Singapore. Previously known from 2 specimens from Amboina and 5 obtained by me in the Philippines. New to the Malay Peninsula.

308. *Ctenogobius viridi-punctatus* (Cuv. & Val.).

Eight examples of this beautiful goby, 38 to 55 mm. in length, were found on a reef at Singapore.

309. *Brachygobius xanthomelas* new species. (Plate IV).

Dorsal VI-I-7; anal I-7; there are 23 to 25 scales in a longitudinal series plus 2 on the caudal base, and 11 or 12 in a transverse series; no predorsal scales.

The plump body is very thickset and robust, the dorsal and ventral profiles both gently convex, with blunt head and convex snout; the depth in mature specimens is 3.4 to 3.65 times, the

head 2.9, the caudal 3.4 to 3.5 in the length; the breadth of the head is 1.16 to 1.25 times in its own length; the eye is high up, in the anterior half of the head in which it is contained 3.15 to 3.25 times and 1.1 to 1.3 times in the interorbital; the broad bluntly rounded snout is 1.5 times in the eye. The mouth is strongly oblique, with projecting chin, the angle of the maxillary beneath the front margin of the pupil; there are 3 rows of teeth above, the outer row of enlarged curved teeth; teeth of the lower jaw apparently in 3 rows but 4 may be present; no canines in either jaw. The head, nape, breast, and pectoral base are naked, the rest of the body covered with ctenoid scales. The first dorsal is low, distant from the second dorsal and not reaching it when depressed, 2.35 to 2.5 times in the head, 1.4 to 1.5 times in the depth; the second dorsal and anal are low, falling far short of the caudal base when depressed, the longest second dorsal ray 2.1 to 2.15, the longest anal ray twice in the head; the least depth of the caudal peduncle is 2.4 in the head. The pectoral and ventral are of equal length, 4.25 to 4.4 in the length; in mature specimens the ventral reaches the large, conical, broadly rounded anal papilla.

In life the colour is clear yellow with 5 or 6 black cross bands; the first is over the eyes to the under side of the head; the second encircles the body before the first dorsal and behind the pectoral base; the third is over the first dorsal and extends downward to the middle of the side; the fourth encircles the body, including the second dorsal and anal except their first two rays; the fifth and sixth are on the caudal peduncle and caudal base respectively; some specimens also have a band over the nape and down on the opercles, and another on the caudal fin; some also have the snout dotted with black; the pectoral has a large black spot on its base; the upper half of the first dorsal is black; the ventrals are colorless. Even the smallest specimens show 5 cross bands, either wholly or in part.

Described from the type, 17.5 mm. long, and 36 paratypes from 9 to 17 mm. in length, from the Mawai district, Johore, and 18 paratypes 10 to 15 mm. in length from Singapore. Six paratypes are in the U. S. National Museum. The Mawai specimens came from wayside ditches of fresh water; the Singapore specimens came from both fresh and brackish water creeks in the northeastern part of the island. This beautiful little goby lives in more or less shady places along the banks of creeks.

According to Bleeker, *Brachygobius xanthozona* has the dorsal VI-I-9; anal I-9; scales about 50 in a longitudinal series. I have little doubt that Duncker's specimens called *Gobius xanthozona* were really *Brachygobius xanthomelas*.

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310. *Aboma aliciae* Herre.

The type and only specimen, 42 mm. long, was caught on a reef in Singapore harbour; described in the Bulletin of the Raffles Museum, 12, 1936, p. 10.

311. *Aparrius acutipinnis* (Cuv. & Val.).

Only 1 specimen was taken at Singapore, its length 60 mm.

312. *Aparrius moloanus* Herre.

Six fine examples of this rare species, 34 to 50 mm. in length, were secured from a Singapore reef. Hitherto it has been known only from the Philippines, where it is rare; new to the Malay Peninsula. Dorsal VI-I-11; anal I-10; 40 scales to the caudal base and 15 from the second dorsal origin to the anal origin.

313. *Callogobius hasseltii* Bleeker.

Two specimens, 29 to 31 mm. long, are from Singapore.

314. *Quisquilius malayanus* Herre.

The type and 3 paratypes, 27 to 31 mm. in length, were collected at Pulau Ubin. Described in the Bulletin of the Raffles Museum, 12, 1936, p. 11.

315. *Zonogobius semidoliatus* (Cuv. & Val.).

Twenty specimens of this handsome little fish, 14 to 19 mm. in length, were taken on Singapore reefs.

316. *Mars cæruleo-maculatus* Herre.

Five fine specimens of this rare Philippine and Pelew Island species were obtained on a Singapore reef, their lengths 38 to 45 mm.

317. *Gobiella birtwistlei* Herre.

The type and 160 paratypes of this tiny goby, 15.5 to 25 mm. in length, were collected in brackish water tidal creeks on Singapore Island. Described in the Bulletin of the Raffles Museum, 9, 1934, page 85.

318. *Smilogobius cinctus* Herre.

The type, a beautiful female specimen 60 mm. long, was collected on a reef in Singapore harbour. No other specimens have been taken as yet. Described in the Bulletin of the Raffles Museum, 12, 1936, p. 12.

This strongly characterized genus, made known from two Philippine species, is now represented by two species from Singapore, *S. cinctus* and the one following.

319. *Smilogobius singapurensis* Herre.

The type, 74 mm. long, and 34 paratypes 26 to 84 mm. in length, were collected on a reef in Singapore harbour. In life this is a conspicuous and handsome species. Described in the Bulletin of the Raffles Museum, 12, 1936, p. 13.

320. *Amblygobius bynoensis* (Richardson).

This handsome goby is very abundant on some reefs, and apparently absent on others about Singapore. Of the large number caught I retained 56, from 45 to 76 mm. in length.

321. *Amblygobius decussatus* (Bleeker).

A specimen of this species, 75 mm. long, was taken at Singapore.

322. *Amblygobius phalæna* (Cuv. and Val.).

A specimen 51 mm. long was secured at Singapore.

323. *Pseudapocryptes lanceolatus* (Bl. and Schn.).

Eight fine specimens, 68 to 102 mm. in length, are from Pulau Ubin.

324. *Apocryptodon sealei* Herre.

A good specimen, 51 mm. long, of this very rare Philippine species, was taken from a reef at Singapore. This is only the second time this fish has ever been collected. New to the Malay Peninsula.

Family PERIOPHTHALMIDÆ

325. *Periophthalmodon schlosseri* (Pallas).

Two small examples of this common inhabitant of muddy shores and mangrove swamps were taken at Pulau Ubin. They are 46 and 49 mm. long.

Family GOBIOIDIDÆ

326. *Tænioides cæculus* (Bloch and Schn.).

A typical specimen 165 mm. long was taken on the Sumatra coast 100 miles west of Singapore.

Family ECHENEIDÆ

Fishes with the first dorsal curiously modified to form a large pad of adhesive lamellæ on top of the head. By means of this they adhere to sharks, turtles, large bony fishes, and the bottoms of boats and are thus carried about.

327. *Echeneis naucrates* (L.).

An example 141 mm. long was caught in the Straits of Malacca, off Malacca.

Family CALLIONYMIIDÆ

Scaleless bottom dwellers in shallow seas and bays, of singular shape and sometimes of bizarre coloration. They are usually very small, rarely of moderate size, and of no direct economic value.

328. *Callionymus enneactis* Bleeker.

Abundant on reefs at Singapore, where I secured 65 specimens, 28 to 34 mm. in length. This little fish was described

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by Bleeker in 1878 from a male specimen 55 mm. long, caught at Singapore. It was not seen again until I collected 2 small examples at Culion, and 3 at Sitankai, Philippine Islands, and re-described it. In 1933 I took 6 small specimens in the Pelew Islands. I have no doubt it occurs in favourable localities all through the South China Sea, the Coast of Borneo, the southern Philippines, and the western Carolines.

### Family URANOSCOPIDÆ

#### 329. *Uranoscopus cognatus* Cantor.

A specimen 66 mm. long was taken on the east coast of Johore.

### Family BLENNIIDÆ

The tropical blennies are all small fishes of rocky shores and coral reefs, of no importance commercially or as food. Many species spend a large part of their time on rocks just out of the water and are among the most active and agile of all fishes. They make the most astonishing leaps and bounds, and scale rocks with great speed; at the mere sight of man they depart from their aerial perches and are exceedingly difficult to capture.

#### 330. *Enchelyurus flavipes* Peters.

In 1868 Peters described this species from 2 specimens collected by Jagor at Singapore. In 1913 Dr. Max Weber described the variety *nigerrima* from 2 examples taken from a small island near Macassar, Celebes. In 1931 I collected a specimen of the variety *nigerrima* at Culion, one of the Philippines. These are all the specimens known before 1934, when I collected 21 specimens, 36 to 59 mm. in length, from a reef in Singapore harbour.

Dorsal 32-33; anal II-20. The depth 4.65 to 5 times, the head 3.9 to 4 times in the length. The convex and nearly vertical snout is 5 times in the head; the eye is far forward, 4.16 to 4.25 times in the head; the angle of the mouth lies beneath the hind margin of the eye; there is a very large posterior canine in the lower jaw and a much smaller one in the upper jaw. The caudal is rounded to somewhat pointed, 5 to 5.35, the broadly rounded pectoral 5.35 to 5.5 times in the head; the ventrals are short in the young, 6 or 8 times in the length, but in more mature examples they reach the anus and are 3.7 to 4 in the length. The dorsal gradually increases in height posteriorly, the last 8 or 10 rays 1.66, the posterior anal rays 2.5 times in the head. The tips of the anal rays are more or less enlarged.

The colour is uniform blackish brown or black all over, including the vertical fins, with an elongate yellow spot covering

most of the caudal, or rarely the yellow may extend forward to include the posterior end of the body and adjacent parts of the dorsal and anal; the dorsal has a narrow white or pale margin and is usually covered by parallel lines on the upper part of its anterior half or two-thirds, or they may cover the lower part also; rarely they are absent. The tips of the anal rays are white, and the anal has 2 longitudinal lines, rarely several.

The pectorals and ventrals are yellow. In alcohol the yellow on the caudal and other fins eventually becomes colourless or white.

331. *Petroscirtes eretes* (Jordan and Seale).

Seven good examples of this Philippine species, 47 to 66 mm. long, were taken at Singapore. New to the Malay Peninsula.

332. *Petroscirtes loxias* (Jordan and Seale).

A small specimen 27 mm. long was collected at Singapore. Hitherto known only from the Philippines.

333. *Salarias fasciatus* (Bloch).

Two specimens of this widely distributed blenny were collected at Singapore, their lengths 95 and 99 mm.

334. *Salarias marmoratus* (Bennett).

Two examples from Singapore are 28 and 63 mm. in length.

Family CONGROGADIDÆ

Eel-like fishes of shallow reefs, reaching a length of two feet or more; eaten, but of no commercial value.

335. *Congrogadus subducens* (Richardson).

Abundant on reefs at Singapore, where I saw many and retained 22 examples, 39 to 331 mm. in length.

Family BROTULIDÆ

336. *Dinematicthys iluocoeteoides* Bleeker.

An insignificant tide-pool fish. Thirteen were taken on a Singapore reef, 35 to 54 mm. in length.

Family BATRACHOIDIDÆ

337. *Coryzichthys diemensis* (Le Sueur).

This unattractive big-headed scaleless fish is common on reefs through the South China Sea. Twenty-five specimens, 30 to 122 mm. in length, were collected from reefs in Singapore harbour.

Family TRIACANTHIDÆ

These silvery little fishes with preposterously long and strong defensive dorsal and ventral spines are often very abundant in bays and protected channels. They are almost worthless for food.

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338. *Triacanthus blochii* Bleeker.

Seven specimens, 57 to 80 mm. long, were collected at Pulau Ubin.

339. *Triacanthus brevirostris* Schlegel.

One of 52 mm. was taken at Singapore and 2 at Malacca, 107 and 133 mm. in length.

340. *Triacanthus oxycephalus* Bleeker.

Eleven examples, 13 to 23 mm. in length, were taken on the coast of Sumatra 100 miles west of Singapore.

341. *Triacanthus strigillifer* Cantor.

A specimen 133 mm. long was caught on the coast of Malacca.

Family MONACANTHIDÆ

Mainly small fishes of tropical coasts, but 2 species occur in all warm seas and one reaches a length of 3 feet. They are of no value as food.

342. *Monacanthus chinensis* (Bloch).

Four specimens from a Singapore reef measure 86 to 131 mm. in length.

343. *Stephanolepis sulcatus*.

Two examples, 22 to 23 mm. in length, were taken at Selat Pau.

344. *Stephanolepis tomentosus* (L.).

This homely little file fish is very abundant on Singapore reefs. Of the large number captured I retained 36 specimens, 28 to 93 mm. in length.

345. *Alutera monoceros* (Osbeck).

Two specimens, 115 to 135 mm. in length, are from the coast of Pahang.

Family OSTRACIIDÆ

Singular fishes covered with bony armorplate; very common on all Indo-Pacific reefs.

346. *Ostracion rhinorhynchus* Bleeker.

A small example, 85 mm. long, was taken at Singapore.

Family TETRAODONTIDÆ

The puffers or balloon fish are remarkable not only for their singular power of inflation, but also for their poisonous flesh.

347. *Chelonodon patoca* (Buch. Ham.).

Three specimens from Telok Anson, Perak, are 37 to 62 mm. in length.

348. *Spherooides lunaris* (Bl. and Schn.).

Of this common puffer the following specimens were secured: 5 from Singapore, 20 to 57 mm. in length; 2 from Telok Anson, Perak, 35 and 36 mm. in length; 2 of 100 and 124 mm. from the coast of Pahang; one of 79 mm. from the coast of Trengganu; and 2 from Singora, Siam, 36 and 46 mm. in length.

349. *Spherooides oblongus* (Bloch).

Five specimens taken at Singapore are 35 to 50 mm. in length, and one from the coast of Trengganu is 79 mm. long.

350. *Tetraodon fluviatilis* Buch. Ham.

Three were secured at Pulau Ubin, 3 at Singapore, and one on the Sumatra coast 100 miles west of Singapore, their lengths from 40 to 65 mm.

351. *Tetraodon immaculatus* Bl. and Schn.

Two examples, 63 and 87 mm. long, were collected at Singapore.

The flat-fishes of the families *Psettodidae*, *Bothidae*, and *Soleidae* are not so important in the tropics as in cold waters, but are nevertheless found in abundance in shallow sandy bays and gulfs. In such places they may be of considerable local importance for food. Very many species occur in Malayan waters, most of them quite small.

## Family PSETTODIDÆ

352. *Psettodes erumei* (Bl. & Schn.).

Two juvenile examples from Singapore are 37 and 41 mm. in length.

## Family BOTHIDÆ

353. *Pseudorhombus affinis*.

Three specimens 115 to 125 mm. in length from Singapore and 3 from Johore Bahru, their lengths 145 to 149 mm.

354. *Pseudorhombus javanicus* (Bleeker).

Two specimens, 135 and 144 mm. in length, collected at Singapore.

355. *Pseudorhombus neglectus* (Bleeker).

Two small examples, 35 and 56 mm. in length, were taken at Singapore.

## Family SOLEIDÆ

356. *Solea humilis* Cantor.

A young specimen, 42 mm. long, was obtained at Singapore.

357. *Euryglossus aspilos* (Bleeker).

Two examples, 50 and 55 mm. in length, were secured at Singapore.

358. *Euryglossus orientalis* (Bl. & Schn.).

Two good specimens, 147 and 149 mm. in length, were purchased in the Singapore market.

359. *Zebrias quagga* (Kaup).

Five examples, 57 to 110 mm. in length, were taken at Singapore.

360. *Zebrias zebra* (Bloch).

One of 113 mm. was secured at Singapore and one 86 mm. long was taken on the Sumatra coast, 100 miles west of Singapore.

361. *Achiroides leucorhynchus* Bleeker.

I have a specimen 68 mm. long from the Sumatra coast 100 miles west of Singapore. Hitherto only known from 7 specimens described by Bleeker from a river at Surakarta, Java, their lengths 30 to 58 mm.

Dorsal 54; anal 37, ventral 3-4; scales in lateral line about 63, plus several on the caudal base; longitudinal series of scale rows immediately above the lateral line, 88.

The depth is twice in the length; the full length of the head is 3.77, or measured to the hook over the mouth 4.1 times in the length; the caudal is 4.25 times in the length.

My specimen is totally blind, the eyes having failed to develop, their position marked by low rounded tubercles; the distance from the angle of the mouth to the lower end of the snout is 2.4 times in the distance to the gill opening; the scales on the coloured side are strongly ctenoid and more than twice as large as those on the under side, which are feebly ctenoid; scales beneath are replaced by filaments or cilia around the mouth, over most of the anterior and lower part of the head, and up along the dorsal base far beyond the length of the head.

The colour on the upper side is nearly uniform brownish; the dorsal and anal are blackish over their basal half, with a narrow whitish margin; caudal whitish; there is a small whitish area behind and above the angle of the mouth; the under side is yellowish, the dorsal and anal dusky bluish.

362. *Cynoglossus bilineatus* (Lacépède).

Two good specimens, 208 and 221 mm. in length, were purchased in the Singapore market.

363. *Cynoglossus borneensis* (Bleeker).

Seven specimens, 113 to 231 mm. in length, were purchased in the Singapore market, and 8 were obtained from Pulau Ketam, Selangor, their lengths 87 to 117 mm. I include here two fine specimens, 235 and 265 mm. in length, from Matang, Perak. The two last are very close to *C. sindensis* Day, but I believe they

belong here. *C. sindensis* has 2 lateral lines on the blind side; the Matang specimens casually seen seem to have 2 lateral lines on the underside, but the upper mark is not a lateral line. Bleeker had but one specimen of *C. borneensis*, 213 mm. long, from Sinkawang, Borneo.

Dorsal 108-114; anal 82-86; scales in lateral line 92 to 100 from caudal base to opposite gill opening, or 100 to 114 from junction of lateral lines to caudal base. The depth is 4.2 to 4.4 times in the length, 4.6 to 4.75 with the caudal; the head is 4.6 to 4.9 in the length, 5.2 to 5.4 with the caudal. The lower eye is larger and farther back than the upper eye; the lower eye is 12.6 to 13.4 times, the upper eye 14 to 18.8 in the head; the interorbital is greater than either eye diameter. The anterior tubular nostril overhangs the upper lip, and is before and a little below the lower margin of the lower eye; the other nostril is between the eyes; the anterior nostril on the blind side is tubulate, the posterior one scarcely so. The hook of the mouth is far forward of a vertical from the eyes; the corner of the mouth is below or a very little behind the rear margin of the lower eye and midway, or nearly so, between the tip of the snout and the gill opening. The scales are strongly ctenoid on the upper side, cycloid on the blind side. Two lateral lines on the upper side, an upper and a median one, separated by 17 to 20 rows of scales; a median lateral line on the lower side.

The colour in alcohol is uniform brown, with 3 parallel longitudinal stripes along the middle of the body, the central one on the median lateral line; the opercular region or posterior half of the head dusky, dappled with numerous brown spots, or becoming uniform blackish brown or dusky bluish; the blind side is colorless. The longitudinal stripes gradually disappear in preserved specimens.

Measurements given are from the larger specimens; some of the smaller examples are slenderer.

#### 364. *Cynoglossus macrolepidotus* (Bleeker).

A fine specimen 335 mm. long was bought in the Singapore market.

#### 365. *Cynoglossus puncticeps* (Richardson).

Three examples were taken at Singapore, one on the Sumatra coast 100 miles west of Singapore, and 2 at Telok Anson, their lengths 86 to 126 mm.

#### 366. *Paraplagusia bilineata* (Bloch).

A small specimen was taken at Singapore, its length 60 mm.

#### Family ANTENNARIIDAE

The frog fishes are small worthless reef dwellers of extraordinary form and habits. They crawl about on the bottom

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and over rocks like toads, using their pectorals and ventrals as if they were legs with hands and feet. Many are provided with a rod and bait which are the highly modified first and second dorsal spines; with these they lure their prey within the gaping mouth below.

### 367. *Antennarius caudimaculatus* Bleeker.

Four specimens, 38 to 85 mm. long, were taken from a reef in the outer harbour at Singapore.

### 368. *Antennarius commersoni* (Lacépède).

Two examples, 55 and 82 mm. in length, were caught on a reef at Singapore.

## PART II. FRESH-WATER FISHES.

By ALBERT W. C. T. HERRE, M.A., PH.D.

and

GEORGE S. MYERS, M.A., PH.D.

### INTRODUCTION.

As explained in the introduction to Part I, which deals with the marine fishes, Part II is published under the joint authorship of Dr. Herre and Dr. Myers. Preliminary identifications of the fresh-water fishes were made by Dr. Herre at Stanford University and most of the material was then shipped to Washington, where the two authors spent a week together going over the fishes and checking literature and doubtful specimens. Most of the actual descriptive matter is the work of the senior author, excepting in *Danio*, *Encheloclarias*, and *Mastacembelus*.

### Family CYPRINIDÆ.

This is the largest family of fishes, containing more species than any other group, marine or fresh water. It is very well represented in the Malay Peninsula, and contains a great variety of fishes. Some are tiny and brilliantly marked or colored, 30 mm. or less in length when adult, so that they are eagerly sought by aquarists of many lands; others are large and bulky, at least a meter long when fully grown. Many species are of local importance as food.

#### Sub-family ABRAMIDINÆ.

##### 1. *Chela hypophthalmus* Bleeker.

A specimen 61 mm. long was taken at Telok Anson, Perak.

1. Excepting certain fresh-water representatives of marine families, for which see Part I of this paper.

2. *Chela oxygaster* (Cuv. & Val.).

Three examples from Singapore Island are 85 to 91 mm. in length; 2 from the outlet of Lake Chin Chin, Jasin, Malacca, are each 173 mm. long, and one taken near Kuala Pilah, Negri Sembilan, is 93 mm. long; one from the Mentiga River, Pahang, is 175 mm. long.

3. *Chela oxygastroides* (Bleeker).

Seventy-eight specimens 16 to 47 mm. in length were taken from the outlet of Lake Chin Chin, Jasin, Malacca; 16 from 23 to 45 mm. were seined near Kuala Pilah, Negri Sembilan; from the Mentiga River, Pahang, is one of 124 mm., and one of 118 mm. is from the Sadong River, Sarawak, Borneo.

4. *Rasborichthys altior* Regan.

Forty-eight specimens were caught in a brook on the Mandai Road, Singapore Island, 50 to 78 mm. in length. Dorsal III—7; anal III—14; lateral line scales 33 plus 3 on caudal base; predorsal scales 20. Many have the dorsal II—8; anal II—17; scales in lateral line 33 plus 2 on the caudal base; predorsal scales 16 or 17.

## Sub-family RASBORINAE.

5. *Rasbora argyrotænia* (Bleeker).

Common everywhere; 3 were taken at Ayer Hitam, Johore, their lengths 31 to 65 mm.; 20 from the outlet of Lake Chin Chin, Jasin, Malacca, their lengths 28 to 96 mm.; 8 from a creek near Kuala Pilah, Negri Sembilan, 26 to 55 mm. in length; 4 from 60 to 75 mm. from Telok Anson, Perak; and one from Lake Chini, Pahang, 69 mm. long.

6. *Rasbora cephalotænia* (Bleeker).

Seven were taken at Singapore on the Mandai road, 19 to 24 mm. in length, and 75 at Ayer Hitam, Johore, 47 to 102 mm. in length.

7. *Rasbora dorsiocellata* Duncker.

Two specimens, 30 and 33 m. long, were taken by Mr. Birtwistle at Tasek Berah, Pahang.

8. *Rasbora einthovenii* (Bleeker).

Three specimens 25 to 43 mm. in length were collected on Singapore Island; 4 from 33 to 43 mm. at Gunong Pulai, Johore; 20 from 24 to 38 mm. in the Mawai District and 12 from 35 to 44 mm. at Ayer Hitam, Johore.

9. *Rasbora elegans* Volz.

Forty-two specimens from 30 to 95 mm. in length were collected in the Mawai District and 125 from 15 to 87 mm. from Gunong Pulai, Johore; from a creek on Singapore Island are 34 to 54 mm. in length.

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Forty-two specimens from 30 to 95 mm. in length were collected in the Mawai District and 125 from 15 to 87 mm. from Gunong Pulai, Johore; from a creek on Singapore Island are 34 to 54 mm. in length.

28. *Chela oxygaster* (Cuv. & Val.).

Three examples from Singapore Island are 85 to 91 mm. in length; 2 from the outlet of Lake Chin Chin, Jasin, Malacca, are each 173 mm. long, and one taken near Kuala Pilah, Negri Sembilan, is 93 mm. long; one from the Mentiga River, Pahang, is 175 mm. long.

29. *Chela oxygastroides* (Bleeker).

Seventy-eight specimens 16 to 47 mm. in length were taken from the outlet of Lake Chin Chin, Jasin, Malacca; 16 from 23 to 45 mm. were seined near Kuala Pilah, Negri Sembilan; from the Mentiga River, Pahang, is one of 124 mm., and one of 118 mm. is from the Sadong River, Sarawak, Borneo.

30. *Rasborichthys altior* Regan.

Forty-eight specimens were caught in a brook on the Mandai Road, Singapore Island, 50 to 78 mm. in length. Dorsal III—7; anal III—14; lateral line scales 33 plus 3 on caudal base; predorsal scales 20. Many have the dorsal II—8; anal II—17; scales in lateral line 33 plus 2 on the caudal base; predorsal scales 16 or 17.

31. *Sub-family RASBORINAE.*32. *Rasbora argyrotænia* (Bleeker).

Common everywhere; 3 were taken at Ayer Hitam, Johore, their lengths 31 to 65 mm.; 20 from the outlet of Lake Chin Chin, Jasin, Malacca, their lengths 28 to 96 mm.; 8 from a creek near Kuala Pilah, Negri Sembilan, 26 to 55 mm. in length; 4 from 60 to 75 mm. from Telok Anson, Perak; and one from Lake Chini, Pahang, 69 mm. long.

33. *Rasbora cephalotænia* (Bleeker).

Seven were taken at Singapore on the Mandai road, 19 to 24 mm. in length, and 75 at Ayer Hitam, Johore, 47 to 102 mm. in length.

34. *Rasbora dorsiocellata* Duncker.

Two specimens, 30 and 33 m. long, were taken by Mr. Birtwistle at Tasek Berah, Pahang.

35. *Rasbora einthovenii* (Bleeker).

Three specimens 25 to 43 mm. in length were collected on Singapore Island; 4 from 33 to 43 mm. at Gunong Pulai, Johore; 20 from 24 to 38 mm. in the Mawai District and 12 from 35 to 44 mm. at Ayer Hitam, Johore.

36. *Rasbora elegans* Volz.

Forty-two specimens from 30 to 95 mm. in length were collected in the Mawai District and 125 from 15 to 87 mm. from Gunong Pulai, Johore; from a creek on Singapore Island are 34 to 54 mm. in length.

37. *Chela oxygaster* (Cuv. & Val.).

Three examples from Singapore Island are 85 to 91 mm. in length; 2 from the outlet of Lake Chin Chin, Jasin, Malacca, are each 173 mm. long, and one taken near Kuala Pilah, Negri Sembilan, is 93 mm. long; one from the Mentiga River, Pahang, is 175 mm. long.

38. *Chela oxygastroides* (Bleeker).

Seventy-eight specimens 16 to 47 mm. in length were taken from the outlet of Lake Chin Chin, Jasin, Malacca; 16 from 23 to 45 mm. were seined near Kuala Pilah, Negri Sembilan; from the Mentiga River, Pahang, is one of 124 mm., and one of 118 mm. is from the Sadong River, Sarawak, Borneo.

39. *Rasborichthys altior* Regan.

Forty-eight specimens were caught in a brook on the Mandai Road, Singapore Island, 50 to 78 mm. in length. Dorsal III—7; anal III—14; lateral line scales 33 plus 3 on caudal base; predorsal scales 20. Many have the dorsal II—8; anal II—17; scales in lateral line 33 plus 2 on the caudal base; predorsal scales 16 or 17.

40. *Sub-family RASBORINAE.*

10. *Rasbora heteromorpha* Duncker.

This lovely little fish swarms in wayside swamps and ditches throughout the lowlands. Thirty were taken at Gunong Pulai and 35 in the Mawai District, Johore, their lengths 11 to 27 mm. It is one of the most popular aquarium fishes in America and Europe.

11. *Rasbora maculata* Duncker.

Four typical specimens from the outlet of Lake Chin Chin, Jasin Malacca, are 15 to 17 mm. in length. This tiny brilliant red fish was synonymized with the much larger *R. kalochroma* by Weber and de Beaufort. *Rasbora maculata* is a perfectly distinct species, never reaching much more than an inch in length. It has been spawned at this size in aquaria in the United States.

12. *Rasbora lateristriata lateristriata* (Bleeker).

Four specimens of the typical subspecies from Chandra Dam, Perak, are 41 to 64 mm. in length, and 5 from a stream at Kuala Korbu, Perak, are 20 to 27.; 6 from Gunong Pulai, Johore, are 19 to 25 mm.

13. *Rasbora lateristriata sumatrana* (Bleeker).

Thirty-five specimens from 25 to 58 mm. in length were taken from Singapore creeks.

14. *Rasbora taeniata* Ahl.

Fifty-five examples of this beautiful lilliputian fish, 15 to 32 mm. in length, were collected from ditches in the Mawai District, Johore.

15. *Rasbora trilineata* Steindachner.

In the Mawai District, Johore, I collected 12 typical specimens, 91 to 118 mm. in length.

16. *Danio regina* Fowler.

A specimen 60 mm. long was taken from the River Plus, near Kuala Legap, Perak. This species was described in 1934 from 2 specimens from Peninsular Siam, and is an addition to the Malay Peninsula fish fauna.

The junior author offers the following remarks on this and related species of *Danio*. Day (Fishes of India, p. 595) distinguished his Burmese *Danio spinosus* largely on the presence of "a sharp spine directed forwards above the anterior superior margin of the orbit, and a second broader and blunter before the center of the eye on the preorbital". I did not use this character in my compiled synopsis of *Danio* (Amer. Mus. Novit., No. 150, 1924, p. 2) since the very small scales of *spinosus* (55 to 65 in the lateral line) seemed to be a more important character.

In their recent synopsis of *Danio*, Hora and Mukerji (Rec. Ind. Mus., vol. 36, 1934, p. 133) utilize the orbital spines to separate *spinosus* from all other species of *Danio*. It may be remarked parenthetically that their count of 33 to 38 scales in the lateral line of *spinosus* must be an error.

Fowler (Proc. Acad. Nat. Sci. Phila., vol. 86, 1934, pp. 341-342, fig. 6) in describing *Danio regina* from Nakon Sritamarat, has erected for it the new sub-genus *Rambabarnia* based on the presence of a small short spine at the front edge of the eye.

Very recently Dr. Y. T. Chu, in an excellent and important study of the pharyngeal teeth and scales of the Chinese Cyprinidae (Biol. Bull. St. John's Univ., Shanghai, no. 2, 1935, pp. 10, 34, and 123), has erected the new genus *Danioides*, with *Danio kakhienensis* Anderson, from Yunnan, as genotype. His description, based on material in the British Museum, is as follows:—"This genus is quite distinct from *Danio* Hamilton-Buchanan (the type of which is *Cyprinus dangila*, as restricted by Bleeker) in having the preorbital with a prominent bony process at its inner lower margin, the outer margin of mandibles entire and not triangularly produced and the first suborbital very broad, completely covering the anterior portion of the cheek, and the scales with peculiar "vertical breaks" connecting the apical radii. *Danio micronema* Bleeker, known from Ceylon and Indian Peninsula; *Danio browni* Regan, from Upper Burma; *Leuciscus lineolatus* Blyth, from Sikkim, all possessing the aforesaid characters, should therefore be also referred to the present new genus".

It will be noted that, of the three species other than *kakhienensis* referred to *Danioides* by Chu, all are currently synonymized with other species of *Danio*. *Danio micronema* is placed by Day in the synonymy of *Danio malabaricus* (Jerdon). *Leuciscus lineolatus* is placed by Day in the synonymy of *Danio aequipinnatus* (McClelland). Finally, Mukerji, (Journ. Bombay Nat. Hist. Soc., vol. 37, no. 1, 1934, p. 76) synonymizes *Danio browni* with *Danio aequipinnatus*.

From this it will be apparent that, if we accept Dr. Chu's observations (which I see no reason to doubt), as well as the current synonymies of the Indian Danios, at least two of the commonest species (*malabaricus* and *aequipinnatus*) possess the same preorbital structure as *Danio spinosus*. This has induced me to examine the few specimens of the genus in the United States National Museum. There are three samples of *Danio regina* (U. S. N. M. 101380) from Chong Waterfall Stream, Trang, Peninsular Siam; three examples of *Danio aequipinnatus* (U. S. N. M. 44803) from Mt. Carin, Burma; one example of

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*Danio dangila* (U. S. N. M. 44802) from Mt. Carin, Burma; and one example of the common aquarium fish *Danio malabaricus* (U. S. N. M. 88052) without locality datum. The examples of *aequipinnatus* and *dangila* are from the Fea collection reported on by Vinciguerra. The aquarium fish usually sold in this country as *malabaricus* is the one excellently figured in color by Innes (Exotic Aquarium Fishes, Ed. 1, 1935, p. 165).

The three *aequipinnatus* from Mt. Carin all possess the preorbital process, as do the three *regina* from Trang and the one from Kuala Legap. It will be noted that Vinciguerra, in reporting these Mt. Carin and other specimens of the Fea collection (Ann. Mus. Civ. St. Nat. Genova, ser. 2, vol. 9, 1890, pp. 304-305), has mentioned the presence of the "spine" on the preorbital bone not only in *aequipinnatus* but also in the specimens he refers to *malabaricus*. Neither my Mt. Carin example of *dangila* nor my aquarium specimen of *malabaricus* have any trace of the preorbital process. It is evident from this that at least two relatively distantly related species of *Danio* have been confused under *Danio malabaricus*, and it may be that there is similar confusion in the other species.

The anteriorly directed supra-orbital spine of *Danio spinosus* and the preorbital process of this and other species are evidently very different structures. In most Danios the frontal bone forms a more or less prominent roof over the eye, and in those species possessing the preorbital process the edge of this frontal roof is more or less rough anteriorly. Sometimes the roughness at the anterior corner of the frontal is spine-like but the character seems to be subject to individual variation in my specimens. In *spinosus* it would appear that the front corner of the frontal bone is more spine-like than in the other species, but I cannot believe that the character is of more than specific value in this case. On the other hand, the preorbital process is a very definite structure of the preorbital (lachrymal) bone. It has the form of a small, prominent, lateral protuberance from the lower posterior part of the bone. It is rounded off at its apex and flattened, the anterior side somewhat concave and the posterior side convex. In my material the presence of the preorbital process is associated with the roughness or spine-like condition of the frontal mentioned, specimens without one structure lacking the other as well.

There is no doubt in my mind that the preorbital process shows relationship among the species possessing it. It is possible that the other characters given by Chu will also be found to characterize a group of Danios. I have not examined these characters since I think it is clear that a careful revision of *Danio* is in order, and I am unable to make such a revision

with the material at hand. The fact that the preorbital process has been almost completely overlooked in so common a species as *Danio aequipinnatus* and that it occurs in specimens that have been identified as the common *D. malabaricus*, show that a careful examination of all the extant types, both of the recognized species and of their current synonyms, is necessary. A study of good series of Danios from various localities, using frequency tables of scale and fin counts and of proportions of each of the samples would doubtless show the presence of several so far unrecognized species, subspecies, and races in the different river systems of India, Burma, and South-eastern Asia.

If the preorbital structure is given systematic recognition as a genus or subgenus, *Danioides* Chu, 1935, will fall as a synonym of *Rambaibarnia* Fowler, 1934. If we remove *Brachydanio*, as I suggested in 1924, *Danio* seems to form such a well-knit group of very similar species that I am inclined to believe the genus should not be split up further, and that *Rambaibarnia* should not be raised above subgeneric rank. However, till the careful type of revision mentioned above has been carried out thoroughly, it will be impossible to pass final judgment on such problems. It may not be out of place to remark that outside of a few restricted groups of fishes, chiefly in Europe and America, no really searching analysis of specific limits has been made in fishes anywhere. Most of our specific diagnoses are no more than a hasty tabulation of two or three characters of a few of the many specimens available, plus a more or less critical guess of the observer.

17. *Luciosoma setigerum* (Cuv. & Val.).

Five examples, 137 to 163 mm. in length, were taken from the River Plus near Kuala Korbu, Perak, and one of 119 mm. from the Muar River near Kuala Pilah, Negri Sembilan.

18. *Luciosoma trinema* (Bleeker).

Two specimens collected from the River Plus near Kuala Korbu, Perak, are 160 and 170 mm. in length, and 5 from Sarawak, Borneo, are 118 to 140 mm.

19. *Barilius guttatus* Day.

Two examples, 150 and 160 mm. in length, were obtained from Ulu Tembeling, northern Pahang.

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20. *Cyprinus carpio* L.

A specimen 167 mm. long was taken from a Bureau of Fisheries experimental pond at Singapore. The fry of this common species is brought from China and cultivated in ponds by Chinese, who singularly enough do not seem to try to breed their own stock.

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21. *Ctenopharyngodon idellus* (Cuv. & Val.).

A specimen 117 mm. long from the experimental pond at Singapore. Introduced from China in the same way as *C. carpio*.

22. *Mylopharyngodon aethiops* (Basilewsky).

A specimen 147 mm. long from the same experimental pond at Singapore. This species is also brought from Kwangtung Province, China, and cultivated in ponds.

23. *Cirrhinus molitorella* (Cuv. & Val.).

A specimen 174 mm. long was taken from a ditch at Singapore, where it had evidently escaped from cultivation, and one of 216 mm. was taken at Chandra<sup>1</sup> Dam, Perak. Cultivated in the same way as the 3 preceding species.

24. *Mystacoleucus marginatus* (Cuv. & Val.).

Specimens of this common species were caught as follows:— Two from Muar, Johore, 55 and 60 mm. in length; 3 from the outlet of Lake Chin Chin, Jasin, Malacca, 25 to 30 mm. in length; 1 from Chandra Dam, Perak, 105 mm. long, and 8 from the River Plus, near Kuala Legap, Perak, 15 to 72 mm. in length.

25. *Dangila cuvieri* Cuv. & Val.

A specimen 102 mm. long is from Malacca, one of 144 mm. from Ulu Jelai, Pahang, and 3 from Bukit Merah, Perak, are 145 to 148 mm. in length.

26. *Dangila fasciata* Bleeker.

A specimen from the River Plus, near Kuala Korbu, Perak, is 150 mm. in length.

27. *Dangila festiva* (Heckel).

Five examples were collected at Singapore, 128 to 152 mm. in length, 2 from Tasek Berah, Pahang, 97 to 102 mm. in length, and 1 of 95 mm. from Ulu Jalai, Pahang.

28. *Dangila lineata* Sauvage.

Three specimens, 148 to 153 mm. in length, were taken at Chandra Dam, Perak River, Kuala Kurau, Perak.

29. *Dangila sumatrana* Bleeker.

A specimen 73 mm. long is from Lake Chin Chin, Jasin, Malacca; 2 from Telok Anson, Perak, are 60 and 61 mm. in length.

30. *Thynnichthys thynnooides* (Bleeker).

One example 160 mm. long is from Lake Chini, Pahang, and 2 of 192 and 195 mm. are from Chandra Dam, Perak.

1. The dam built by the Perak River Hydro-Electric Power Co.; more correctly spelt "Chenderoh Dam". Ed.

31. *Osteochilus hasseltii* (Cuv. & Val.).

A great many were caught at Lake Chin Chin, near Jasin, Malacca, and 50 fine specimens were retained, from 27 to 122 mm. in length; one of 50 mm. was taken at Ayer Hitam, Johore; 1 of 124 mm. is from Ulu Tembeling, Pahang, and 2 of 40 and 56 mm. are from the River Plus, near Lasah, Perak.

32. *Osteochilus melanopleura* (Bleeker).

A specimen 118 mm. long was collected at Lake Chini, Pahang, and 2 were taken at Chandra Dam, Perak, their lengths 196 and 300 mm.

33. *Osteochilus spilurus* (Bleeker).

Twenty specimens from 42 to 73 mm. in length were netted at Ayer Hitam, Johore.

34. *Osteochilus triporus* (Bleeker).

Four fine specimens from Chandra Dam, Perak River, Perak, belong here, their lengths 190 to 205 mm.

35. *Osteochilus vittatus* (Cuv. & Val.).

Examples of this widely distributed species were taken as follows:—4 from the Mawai District, Johore, 110 to 127 mm. in length; 2 from Lake Chini, Pahang, 82 and 130 mm.; 2 from Chandra Dam, Perak, 150 and 200 mm. in length; 3 of 120 to 146 mm. from River Plus near Kuala Korbu, Perak, and 2 from the Sadong River, Sarawak, Borneo, 200 and 210 mm. in length.

36. *Hampala ampalong* (Bleeker).

A specimen 138 mm. long is from the Sadong River, Sarawak, Borneo.

37. *Hampala macrolepidota* (Cuv. & Val.).

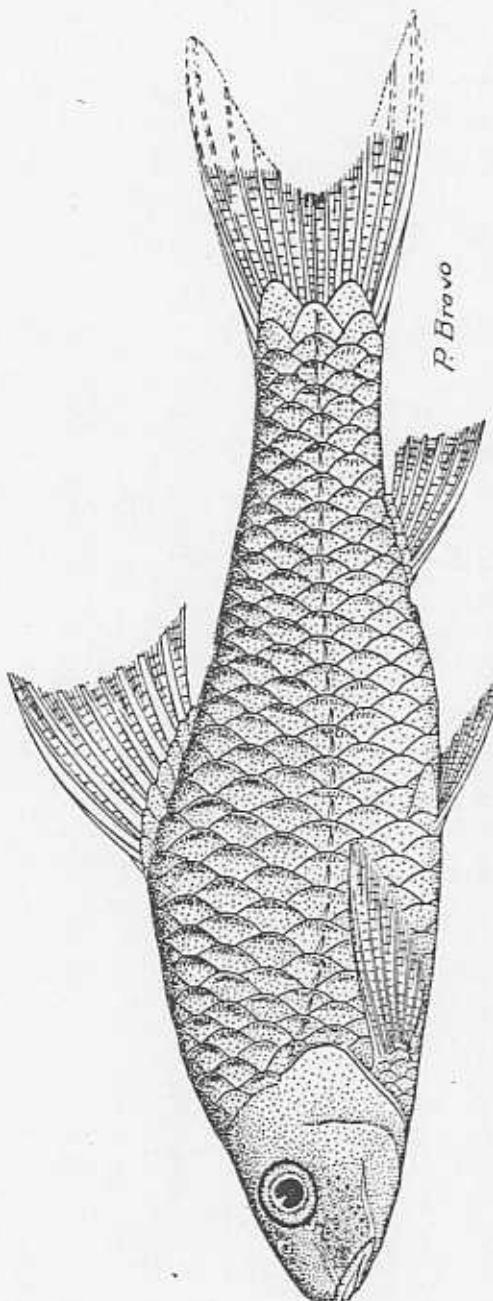
This handsome species reaches a length of 700 mm. and is abundant in strongly flowing streams everywhere. A fine series from 67 to 172 mm. in length was collected as follows:—Singapore Island, 5; Mawai District, Johore, 1; Lake Chin Chin, near Jasin, Malacca, 8; Ulu Bendul, Negri Sembilan, 1; Ulu Jelai, Pahang, 1; River Plus, near Kuala Legap, Perak, 1.

38. *Tor tambda* (Cuv. & Val.).

Three young specimens from 23 to 27 mm. in length were collected near Kuala Pilah, Negri Sembilan; from the headwaters of the River Plus, eastern Perak, Mr. Tweedie obtained a specimen 81 mm. long and about 210 others from 10 to 36 mm. in length. The genus *Labeobarbus* is a synonym of *Tor*.

39. *Tor tambroides* (Bleeker).

A single specimen 85 mm. long was seined from a stream on Singapore Island; 1 of 75 mm. is from Chandra Dam, and



*Lissochilus tweediei* n.sp. (Length of type 92 mm.).

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one 285 mm. long was caught in the River Plus, near Kuala Legap, Perak.

40. *Probarbus jullieni* Sauvage.

A fine example, 385 mm. long, of this rare and handsome fish was taken at Chandra Dam, Perak. Originally described from Laos, Indo-China, it has also been found in Siam where it is a rare food fish, commanding the highest price of any Siamese fish. New to the Malay Peninsula.

41. *Cyclocheilichthys apogon* (Cuv. & Val.).

Very common in streams throughout the Malay Peninsula. Specimens were collected as follows, their lengths from 29 to 131 mm.:—3 from Gunong Pulai, 3 from the Mawai District, and one from Muar, Johore; 1 from Tasek Berah, Pahang; 9 from the outlet of Lake Chin Chin, near Jasin, Malacca; 1 from Ulu Bendul and 4 from the Muar River, near Kuala Pilah, Negri Sembilan; and 2 from Bukit Merah, Perak.

42. *Cyclocheilichthys armatus* (Cuv. & Val.).

Two examples from Chandra Dam, Kuala Kurau, Perak, 160 and 167 mm. in length.

43. *Cyclocheilichthys heteronema* (Bleeker).

Two specimens were collected at Muar, Johore, and 30 near Kuala Pilah, Negri Sembilan, their lengths 19 to 61 mm.

44. *Cyclocheilichthys janthochir* (Bleeker).

Three specimens, 36 to 43 mm. in length, were caught in the Perak River, Perak. This is a Borneo fish not hitherto recorded from the Malay Peninsula.

45. *Lissochilus smedleyi* de Beaufort.

Twenty-two excellent examples of this inhabitant of torrential mountain streams were taken from Ulu Bendul, Negri Sembilan, at an altitude of nearly 1,000 feet; they are from 35 to 117 mm. in length. Two from the outlet of Lake Chin Chin, Jasin, Malacca, are 24 and 42 mm. in length, and one from the River Yum, a tributary of the River Plus, Perak, is 74 mm. long. In life this agile and handsome denizen of cataract-like brooks is brilliant bluish-gray silvery, with orange or yellow tubercles on the snout.

46. *Lissochilus tweediei* new species. (Plate V).

Dorsal IV-8; anal III-5; scales in lateral line 25 plus 1 on caudal base; 4 scales above and 4 below the lateral line; predorsal scales, scales around caudal peduncle 12.

The depth is 3.17 to 3.25, the head 3.55 to 3.8 times in the length. The snout equal the interorbital, 3 times in the head, the eye 4 times. The body is much compressed, especially on

the posterior half, the dorsal fin at the posterior end of an appressed elevated ridge; the profile descends in a broad curve from the dorsal origin to the broad blunt snout; the ventral profile is evenly curved from the snout to the hind end of the anal base. The nearly circular eye is one and a third times in the snout; the rostral barbel equals the eye, and the maxillary barbel is one and a third times an eye diameter. The preorbital and suborbital bear numerous tubercles on pores.

The lower jaw is broad and flat-edged in front, with a free, sharp, horny edge. The lower lip has become nearly obliterated at its anterior margin, being indicated in this place merely by a line across the underside of the jaw a short distance behind the sharp jaw edge. The fold delimiting the lip posteriorly is deep and plain at each side, but is broadly interrupted in the middle. In the form of the lower jaw and lips, *L. tweediei* is practically identical with Steindachner's figure of the mouth of the Chinese *L. fasciatus* (Denkschr. Akad. Wiss. Wien, vol. 59, 1892, p. 372, pl. 4, fig. 2a) excepting that there is no faint line delimiting the anterior margin of the lip in the Chinese species.

The dorsal origin is opposite the eighth scale of the lateral line, the ventral origin opposite the ninth. The dorsal is rather deeply emarginate, its fourth spine moderately stout and smooth behind, its total height about 4.3 times in the length or seven-eighths of the head, the bony part of the spine two-thirds of the total height. The third simple anal ray is weak, about two-thirds the height of the fourth dorsal spine. The pectorals are 1.2 to 1.3 times in the head, longer than the ventrals which are 1.4 to 1.5 in the head. The least depth of the caudal peduncle is about 1.3 times in its own length. The caudal has been damaged in our specimens but was evidently deeply forked and rather long.

The color of preserved specimens is dusky brown above and on the sides, each scale with a blackish vertical bar, but lacking the bars and becoming yellow on the lower half of the caudal peduncle, on the cheeks, and under the head. The fins are yellowish and were evidently colorless in life.

Described from the type, 92 mm. in length, 2 paratypes in the Museum of Stanford University, and one paratype in the U. S. National Museum, 64 to 75 mm. in length. They were taken from the River Yum, a tributary of the River Plus, in eastern Perak, at an altitude of about 2,000 feet, by Mr. M. W. F. Tweedie.

This distinct species is widely different from *Lissochilus normani* (Smith), *L. smedleyi* de Beaufort, *L. dukai* (Day), and *L. sumatrana* Weber and de Beaufort, in the very broad, sharp, horny edge to the lower jaw and the almost complete suppression

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or reduction of the lower lip. In this it resembles such Chinese species as *L. fasciatus* (Steindachner), but it differs from all the described Chinese species in its much larger scales. From *L. hutchinsoni* Fowler (Proc. Acad. Nat. Sci. Phila., vol. 86, 1934, p. 120, figs. 76-77) of Siam, *L. smedleyi* appears to differ in the somewhat smaller scales and the plain fins.

### 47. *Puntius binotatus* (Cuv. & Val.).

Very common in ponds and streams, from the lowlands of the Malay Peninsula through Sumatra, Java, Borneo, to Mindanao, Philippine Islands, where it occurs in the highlands at 3,000 feet altitude. The specimens are very variable and probably several races or subspecies are included. From Singapore are 35 specimens 27 to 103 mm. in length, and also 45 from 13 to 44 mm., which are typical *P. maculatus* of authors; from Gunong Pulai, Johore, come 36 specimens 23 to 63 mm. in length and 27 *P. maculatus* 12 to 27 mm. in length; from the Mawai District Johore, are 21 examples 37 to 80 mm. in length; from Lake Chini, Pahang, is one of 137 mm., and from Ulu Bendul, Negri Sembilan, one of 65 mm.; a specimen 52 mm. long is from the River Plus, and from Bukit Merah, Perak, is one that is typical *P. goniosoma* Bleeker.

### 48. *Puntius bramoides* (Cuv. & Val.).

One example 118 mm. long was collected from Ulu Tembeling, northern Pahang, and 1 of 106 mm. from Bukit Merah, Perak.

### 49. *Puntius bulu* (Bleeker).

Two very fine specimens, 155 and 164 mm. in length, were collected at Chandra Dam, and 1 of 113 mm. was purchased in the market at Telok Anson, Perak. This seems to be the first record from the Malay Peninsula.

### 50. *Puntius fasciatus* (Bleeker).

Two examples, 39 and 42 mm. in length, from Tasek Berah, Pahang, have no rostral barbels and the maxillary barbels are very short, being contained 4 to 5 times in the eye. At Ayer Hitam I secured a fine series of 25 specimens from 49 to 79 mm. in length.

### 51. *Puntius halei* (Duncker).

Of this rare species I collected but one specimen 89, mm. long, from a brook on Singapore Island.

### 52. *Puntius hexazona* Weber and de Beaufort.

From roadside ditches in the Mawai District, Johore, I collected 50 examples of this handsome little fish, 16 to 27 mm. in length.

53. *Puntius lateristriga* (Cuv. & Val.).

This handsome and attractive species occurs throughout. Examples were secured as follows:—1 of 43 mm. from Singapore Island; 8 from 50 to 55 mm. in length from the Mawai District, and 38 from 20 to 88 mm. from Gunong Pulai, Johore; 10 from 14 to 29 mm. in length from a creek near Kuala Pilah, Negri Sembilan; one of 122 mm. from the Sadong River, Sarawak, Borneo, and 2 from the Sedagong River, Pulau Tioman, at an altitude of 1,000 feet are 62 and 72 mm. in length.

54. *Puntius partipentazona* (Fowler).

From a school playing in the shade of overhanging trees and roots, in water one to two meters deep, I succeeded in dipping up 35 specimens of this pretty little fish at Lake Chin Chin, Jasin, Malacca, their lengths 12 to 28 mm. A single example 24 mm. long was taken from a creek near Kuala Pilah, Negri Sembilan. Duncker had this diminutive cyprinid from two localities in Negri Sembilan, but called it a variety of *Barbus sumatrana*. Fowler described it from Siam.

55. *Puntius schwanefeldi* (Bleeker).

Eighteen specimens, 37 to 80 mm. in length, were collected in the Mawai District, Johore; 3 from Lake Chini, Pahang, measure 66, 138, and 162 mm.; and 2 from Chandra Dam, Perak River, Perak, are 159 and 160 mm. in length.

56. *Puntius strigatus* (Boulenger).

A specimen of this rare Borneo species, 58 mm. long, was taken at Gunong Pulai, Johore. New to the Malay Peninsula.

57. *Puntius tetrazona* (Bleeker).

A poor specimen 25 mm. long was taken at Singapore and a very fine one of 58 mm. at Gunong Pulai, Johore. I place here 3 specimens 16 to 18 mm. in length which were seined from a creek near Kuala Pilah, Negri Sembilan. They are not typical, but are a variety of *P. tetrazona*. The first cross band is represented by a short bar at the shoulder; the second band stops 2 scales above the ventrals; the third band is represented by a short bar and a spot at the anal base; and the fourth by a spot at the end of the caudal peduncle. Scales in longitudinal series 21 or 22.

58. *Balantiocheilus melanopterus* (Bleeker).

A specimen 196 mm. long of this boldly marked fish was taken at Chandra Dam, Perak river, Perak.

59. *Barbichthys laevis* (Cuv. & Val.).

The collection contains one of 60 mm. from Telok Anson, and two of 144 and 156 mm. from Chandra Dam, Perak.

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60. *Labeo pleurotaenia* (Bleeker).

Two specimens were obtained from the River Plus, near Kuala Legap, Perak, their lengths 106 and 112 mm.

61. *Epalzeorhynchus siamensis* Hugh Smith.

This rare fish seems to be widely distributed. Four specimens, 37 to 90 mm. in length, were secured, one from each of the following localities:—the outlet of Lake Chin Chin, Jasin, Malacca; Ulu Tembeling, northern Pahang; near Kuala Pilah, Negri Sembilan; and the River Plus, Perak. New to the Malay Peninsula.

62. *Crossochilus oblongus* (Cuv. & Val.).

Three specimens were seined from the Muar river near Kuala Pilah, Negri Sembilan, and 4 were taken from the River Plus, near Kuala Legap, Perak, their lengths 81 to 90 mm.

Family COBITIDÆ.

The loaches are small slender fishes living on the bottom of streams, usually in mountain brooks.

63. *Acanthophthalmus kuhlii* (Cuv. & Val.).

A typical specimen 55 mm. long was taken in the outlet of Lake Chin Chin, near Jasin, Malacca, and one of 19 mm. from the Mawai District, Johore.

64. *Acanthophthalmus muræniformis* de Beaufort.

Seven specimens of this rare and beautiful little cobitid, 43 to 49 mm. in length, were collected at Gunong Pulai, Johore. They seem to be a little stouter than Dr. de Beaufort's examples which came from Singapore. He gave the "height about 16"; I find depth 11.4 to 12 without the caudal, the head 7 to 7.3 times in the length.

65. *Nemacheilus selangoricus* Duncker.

Common on Singapore Island, where 30 specimens were collected, 25 to 50 mm. in length; one of 40 mm. was caught in the River Plus, near Lasah, Perak.

Family CLARIIDÆ.

Elongate catfishes found everywhere in the lowlands in muddy ponds, swamps, and streams. They are important market fish, much esteemed for food.

66. *Clarias batrachus* (L.).

An example 201 mm. long and one of only 31 mm. were caught at Singapore; 3 from Ayer Hitam, Johore, measure 137 to 143 mm., and one from Chandra Dam, Perak, is 215 mm. long.

67. *Clarias leiacanthus* Bleeker.

A specimen from a roadside ditch in the Mawai District measures 225 mm.

68. *Clarias melanoderma* Bleeker.

A specimen 197 mm. long was collected on Singapore Island and one of 175 mm. in the Mawai District, Johore.

69. *Clarias teysmanni* Bleeker.

Two examples, 121 and 131 mm. long were seined from a pond at Singapore; 3 were taken at Gunong Pulai, Johore, 27 to 60 mm. in length, and one of 99 mm. from the River Plus, near Lasah, Perak.

*Encheloclarias* new genus.

Genotype.—*Heterobranchus tapeinopterus* Bleeker.

Clariid Nematognathi with the dorsal fin divided into two parts, the first of soft rays, the second an adipose fin of great length supported by extremely weak extensions of the neural spines. Caudal portion of body (posterior to anus) much longer than head and trunk. Anal fin extending forward under most of base of dorsal fin. Dorsal fin originating far behind the very small head. Caudal fin confluent with anal and adipose fins. Head and body narrow and slender, the general form eel or loach-like.

This diagnosis will serve to distinguish the sole Asiatic *Heterobranchus*-like Clariid from its close relatives in Africa. It seems probable that *tapeinopterus* is not directly related to the African species of *Heterobranchus*, in spite of the fact that comparison of our single specimen with African forms shows striking similarity in many points.

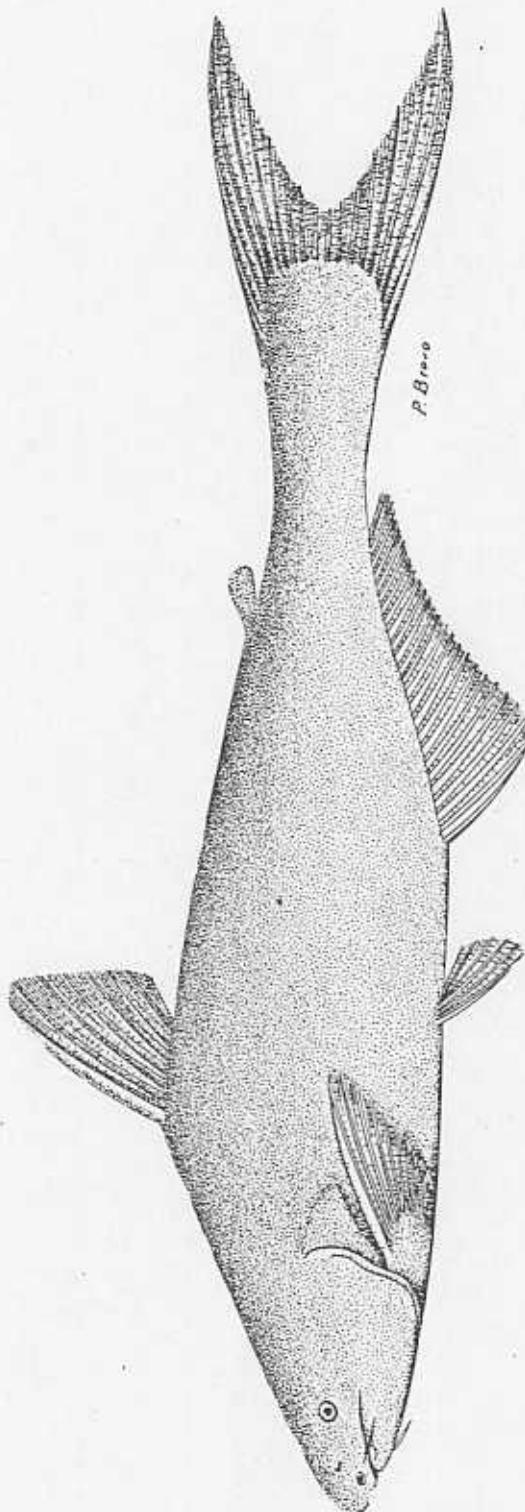
70. *Encheloclarias tapeinopterus* (Bleeker).

This remarkable little catfish has hitherto been known only from a few specimens reported many years ago by Bleeker from Banka and Sarawak. A single specimen was given to the senior author by some young men who had it alive in a bottle at Mawai, Johore. They caught it in a ditch flowing into the Sedili-Besar River and one of them said, "We have never seen an eel like it before." The following measurements in millimeters will indicate the proportions: Standard length 63; head 9; depth 6; predorsal distance 18; preanal distance 26; postanal distance 37. There are 25 dorsal rays, 49 anal, 6 pelvic, and the pectoral bears a stout spine and 8 rays. This species is a notable addition to the fauna of the Malay Peninsula.

Family SILURIDÆ.

71. *Silurichthys phaiosoma* (Bleeker).

Specimens of this little catfish were collected as follows:—1 of 70 mm. from a pond on Singapore Island, 4 from 42 to 125 mm. at Gunong Pulai, and 3 from 17 to 40 mm. in the Mawai District, Johore; and one of 48 mm. at Telok Anson, Perak.



*Pungasius ponderosus* n.sp. (Length of type 660 mm.).

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72. *Silurodes hypophthalmus* (Bleeker).

A single specimen, 146 mm. long, was obtained at Telok Anson, Perak.

73. *Ompok bimaculatus* (Bloch).

Four typical examples, 133 to 305 mm. in length, were seined on Singapore Island, and 2 were obtained from Singora, Siam, 60 and 148 mm. in length.

74. *Kryptopterus macrocephalus* (Bleeker).

A specimen 66 mm. long was taken at Bukit Merah, Perak. New to the Malay Peninsula.

75. *Kryptopterus micronema* (Bleeker).

Examples were secured at Singapore, Muar, and the Mawai District, Johore, the outlet of Lake Chin Chin, Jasin, Malacca, and from the Muar River, near Kuala Pilah, Negri Sembilan. The only specimen now in my possession is one of 65 mm. from Negri Sembilan. New to the Malay Peninsula.

Family CHACIDÆ.

76. *Chaca chaca* (Buch. Ham.).

This is the most singular looking of the Malayan catfishes. A specimen 142 mm. long was collected at Bukit Merah, Perak.

Family PANGASIIDÆ.

77. *Pangasius micronema* Bleeker.

A specimen from Bukit Merah, Perak, is 166 mm. long. New to the Malay Peninsula.

78. *Pangasius pangasius* (Buch. Ham.).

Three fine specimens of this Indian species, 235 to 265 mm. in length, were taken at Chandra Dam, Perak; 5 examples taken in the outlet of Lake Chin Chin, Jasin, Malacca, have either been mislaid or else shipped to another Museum in exchange by error.

79. *Pangasius ponderosus* new species. (Plate VI).

Dorsal I-7; anal III-24; pectoral I-10; ventral I-5.

The body is broad, thickset, the anterior profile straight or slightly concave from the broadly rounded snout to the dorsal, behind which it is very slightly convex to the caudal peduncle. The depth at the dorsal origin is 4.28 times, at the anal origin 4.76, the predorsal length 2.79, the head 4.5 times in the length. The depth of the head is 1.34, the width of the head 1.37, the interorbital 1.77 times in the head; the mouth is decidedly inferior, its width equaling the broad thick snout, both 2.2 times in the head; the postorbital part of the head is a trifle less than the eye and snout together. The eye is 11 times in the head,

6.25 in the interorbital, and 5 times in the snout; it is opposite the anterior nostril and above the corner of the mouth; the large open posterior nostril is much higher than the anterior one.

The maxillary barbel is concealed in a long deep slit; it commences above the angle of the mouth and goes a little past the hind margin of the eye; the mandibular barbel is a little longer than the eye.

The stout flattened dorsal spine is strongly denticulated behind, the very numerous denticulations small, sharp, and strong. The dorsal spine is 1.46, the first dorsal ray 1.37 times in the head; the dorsal base is 3 times the anal base, which is 4 times in the length.

The broad flattened pectoral spine is very strong, with denticulations on its inner margin like those on the dorsal spine, its length 1.51 in the head. The adipose fin origin is above the sixteenth anal ray, the height of its anterior edge twice, its posterior edge 1.75, its base 1.5 times the diameter of the eye. The ventrals have been injured; the large, widely-forked tail is contained 3.75 times in the length, its upper lobe the longer.

The villiform teeth are alike in both jaws and on the roof of the mouth; the vomerine patches are united and confluent with the palatine teeth.

The color in alcohol is blackish plum above, becoming yellowish white on the lower part of the posterior half and on the under side of the head and body. The dorsal and adipose fins are dusky or blackish, the other fins all more or less reddish brown.

Described from the type and only specimen, 600 mm. long, taken at Chandra Dam, Perak. The species of *Pangasius* are in considerable confusion but we can identify this one with none of the described forms.

#### Family SISORIDÆ.

##### 80. *Glyptothorax platypogon* (Cuv. & Val.).

A specimen 42 mm. long was collected at Muar, Johore, and Mr. Tweedie secured one of 52 mm. from the River Plus, near Kuala Legap, Perak. Previously known from Java, Sumatra, and Borneo; new to the Malay Peninsula.

#### Family BAGRIDÆ.

##### 81. *Mystus baramensis* (Regan).<sup>(1)</sup>

I collected 3 specimens of this rare species, 50 to 60 mm. in length, from Lake Chin Chin, Jasin, Malacca, and received

<sup>1</sup>. NOTE.—It appears that *Mystus* Scopoli, 1777, must replace *Macrones* and *Aoria*.

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one of 103 mm. from Singora, Siam. New to the Malay Peninsula.

82. *Mystus gulio* (Buch. Ham.).

A specimen 116 mm. long was taken at Ayer Hitam, Johore.

83. *Mystus micracanthus* (Bleeker).

Specimens were collected as follows:—1 in the Mawai District, Johore, 1 from the outlet of Lake Chin Chin, Jasin, Malacca, 2 at Telok Anson, Perak, and 1 at Singora, Siam, their lengths 55 to 134 mm.

84. *Mystus nemurus* (Cuv. & Val.).

Five examples were taken at Singapore, 2 at Ayer Hitam, Johore, 4 at Lake Chin Chin, Jasin, Malacca, 2 at Lake Chini, Pahang, 7 at Bukit Merah, 2 at Telok Anson, and 1 at Chandra Dam, Perak, their lengths 67 to 152 mm.

85. *Mystus nigriceps* (Cuv. & Val.).

One hundred and eight specimens 45 to 82 mm. in length were caught in the outlet of Lake Chin Chin, Jasin, Malacca, one of 87 mm. at Ayer Hitam, Johore, 9 from 62 to 92 mm. at Telok Anson, and 3 from 190 to 195 mm. at Chandra Dam, Perak.

86. *Mystus planiceps* (Cuv. & Val.).

A badly damaged example, 165 mm. long, was taken by Mr. Tweedie from the River Plus, near Kuala Legap, Perak.

87. *Leiocassis leiacanthus* Weber & de Beaufort.

A specimen 31 mm. long of this very rare and handsome little catfish was taken from a brook in the Mawai District, Johore, and Mr. Tweedie obtained one 39 mm. long from the River Plus, Perak. Hitherto known only from Sumatra and new to the Malay Peninsula.

88. *Leiocassis micropogon* (Bleeker).

An example 146 mm. long was taken from the outlet of Lake Chin Chin, Jasin, Malacca.

Family CYPRINODONTIDÆ.

89. *Aplocheilus javanicus* (Bleeker).

Thirty-five specimens, 13 to 26 mm. in length, were taken at Singapore, where it is common in fresh water ditches, ponds, and flooded areas.

90. *Panchax panchax* (Buch. Ham.).

Forty specimens collected at Singapore are 12 to 42 mm. in length; abundant in ponds and all quiet fresh water.

## Family PHALLOSTETHIDÆ.

A group of very peculiar fishes apparently belonging to a sub-order (Phallostethoidea) related to the Mugiloidea or Polynemoidea. They are known to inhabit brackish and lowland waters of Siam, the Malay Peninsula, Palawan, Leyte, and Luzon, and three species occur in upland waters in Luzon.

91. *Neostethus bicornis* Regan.

Eighteen specimens, 18 to 30 mm. in length, were obtained from tidal ponds of brackish water on the north-east coast of Singapore Island. There is a considerable variation in the saline content of the water; at high tide it is practically ordinary sea water, while at low tide it may be almost fresh.

## Order LABYRINTHICÆ.

Fresh water fishes of south-eastern and southern Asia and the large islands adjacent, and of tropical Africa. Three families are included, all of them dependent upon breathing air direct in addition to the oxygen obtained through their gills. A number are important food fishes and one is extensively propagated in ponds.

## Family LUCIOCEPHALIDÆ.

92. *Luciocephalus pulcher* (Gray).

Five specimens were taken from a stream on Singapore Island, 1 from Gunong Pulai, 2 from the Mawai District, and 3 from Ayer Hitam, Johore, and 2 from the outlet of Lake Chin Chin, Jasin, Malacca, their lengths 46 to 117 mm.; 2 in the National Museum from the Simujan River, Sarawak, collected by W. T. Hornaday in 1877.

This strange fish lies motionless at the surface of the water, usually near the margin of a stream in some eddy or backwater, where the current will bring it food. At a casual glance it seems but a floating stick. It is a voracious predator.

Family OPHICEPHALIDÆ.<sup>1</sup>93. *Ophicephalus bistriatus* Weber & de Beaufort.

Twenty-six specimens of this very handsome species, 28 to 58 mm. in length, were seined from a brook on Singapore Island. Previously known only from 6 specimens collected in Sarawak, and 3 at Balikpapan, Borneo. Specimens in the Raffles Museum from Bukit Merah, Perak.

<sup>1</sup>. The junior author believes that *Channa* should supplant *Ophicephalus* for these species. (See Myers and Shapovalov, Peking Nat. Hist. Bull., 1931, vol. 6, pt. 2, p. 33).

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94. *Ophicephalus gachua* Buch. Ham.

Specimens of this common species were taken as follows:— 2 on the Mandai Road, Singapore Island, 80 to 101 mm. in length; 2 from Gunong Pulai, Johore, 85 and 92 mm. in length; one of 42 mm. from near Kuala Pilah, and 10 from Ulu Bendul, Negri Sembilan, 63 to 126 mm. in length; 11 from the headwaters of the River Plus, near Kuala Legap, Perak, 60 to 95 mm. in length, and one of 19 mm. from the same locality.

95. *Ophicephalus lucius* (K. & v. H.) Cuv. & Val.

Three from Gunong Pulai, Johore, are 145 to 164 mm. in length and 10 from the outlet of Lake Chin Chin, Jasin, Malacca, are 42 to 130 mm.; from Chandra Dam, Perak, comes one of 267 mm.

96. *Ophicephalus maruiooides* Bleeker.

A specimen 140 mm. long was secured from Singora, Siam.

97. *Ophicephalus melanosoma* Bleeker.

An example 236 mm. long was collected by Mr. Tweedie at Gunong Pulai, Johore, and 4 from the outlet of Lake Chin Chin, Jasin, Malacca, are 140 to 154 mm. Many others were caught at the latter locality but were not kept. Two young specimens, 21 and 35 mm. long, are from the River Plus, Perak.

98. *Ophicephalus micropeltes* (K. & v. H.) Cuv. & Val.

Three fine specimens from 230 to 328 mm. in length were caught at Chandra Dam, Perak.

99. *Ophicephalus striatus* Bloch.

Ten specimens from ponds and streams on Singapore Island are 31 to 196 mm. in length; 5 from Ayer Hitam, Johore, are 140 to 152 mm. in length, and one from Chandra Dam, Perak, is 310 mm. long. This valuable food fish occurs everywhere from India to the Philippines. Many were caught but only the above were kept.

Family ANABANTIDÆ.

100. *Helostoma temminckii* Cuv. & Val.

Four specimens, 40 to 44 mm. long, were taken with a cast net at Ayer Hitam, Johore.

101. *Belontia hasseltii* (Cuv. & Val.).

Nine specimens, 62 to 75 mm. in length, were taken with a cast net at Ayer Hitam, Johore; 2 from Singapore are 90 and 103 mm., and 1 from Bukit Merah, Perak, is 105 mm. long.

102. *Osphronemus goramy* Lacépède.

This delicious food fish is the most valuable member of the order. As it is vegetarian it is eminently adapted to pond culture. Old specimens attain a weight of 18 or 20 pounds.

Two specimens, 166 and 169 mm. long, were taken from a pond at Singapore; 2 from near Kuala Pilah, Negri Sembilan, are 140 and 148 mm., and 2 from Chandra Dam, Perak, are 200 and 215 mm. A juvenile specimen 20 mm. long was taken from a ditch near Muar. One in the National Museum from Selangor, and another from the Sadong River, Sarawak, both collected by W. T. Hornaday in 1877.

103. *Trichopsis vittatus* (Cuv. & Val.).

This little fish swarms in brooks, ditches, and overflow waters everywhere. A large series of approximately 150 was taken from streams and shallow puddles on Singapore Island, their lengths 16 to 38 mm.

The junior author has compared material with the Indian *Ctenops nobilis* McClelland, and is of the opinion that *Ctenops* and *Trichopsis* are perfectly distinct genera. On his advice Fowler has already used *Trichopsis* in the description of *T. harrisi*, a doubtful new form from Siam (Proc. Acad. Nat. Sci. Phila., vol. 86, 1934, p. 348).

104. *Betta anabatoides* Bleeker.

A specimen from Singapore, 35 mm. long, seems to belong here. The maxillary extends a little beyond the front margin of the eye. The caudal rays are more or less produced.

105. *Betta taeniata* Regan.

Common all through the Malay States. Specimens from 12 to 67 mm. in length were taken as follows:—Singapore, 15; Gunong Pulai, 30; Mawai District, Johore, 35; from the middle reaches of the River Plus, near Lasah, Perak, 5. These specimens do not agree entirely with *taeniata*; they are very variable, some having one and others 2 dorsal spines. They may represent *B. brederi*.

106. *Anabas testudineus* (Bloch).

Abundant in swamps and ponds everywhere. Of the large number taken the following were kept, their lengths 64 to 134 mm.; Singapore, 6; Ayer Hitam, Johore, 6; the outlet of Lake Chin Chin, Jasin, Malacca, 8; Bukit Merah, Perak, 1.

107. *Parosphromenus deissneri* (Bleeker).

A specimen 18 mm. long, or 24 mm. with the caudal fin, was taken from the outlet of Lake Chin Chin, near Jasin, Malacca. Another with the same data is in the United States National Museum. This lovely little fish was described by Bleeker in 1859 from a specimen 34 mm. long, including the caudal, taken on the island of Banka, and has never been collected since until now.

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Dorsal XIII-7; anal XIII-7; scales in lateral line 30, with 3 or 4 more on the caudal base; transverse series of scales, 11. The depth is 3.6, the head 3.27, the caudal 3, the ventral 2.57, the pectoral 4 times in the length. The eye is 2.75 times in the head and is twice in the snout. The head is acute. The first ventral ray is produced into a filament which extends nearly to the middle of the anal.

In life this beautiful species is brilliant rose red, with two black longitudinal bands, one from the tip of the snout over the eye to the tip of the caudal, the other from the upper margin of the eye back to the caudal base where it descends to join the first band, the caudal fin otherwise intense crimson. A black median stripe from the snout to the dorsal where it divides and forms a black line along the dorsal base. A black band extends from the cheek and opercle below the pectoral and along the anal base. The pectoral is colorless, the dorsal black with a broad longitudinal rose red band along its middle, the ventrals and anal black.

This is a notable addition to the fauna of the Malay Peninsula.

108. *Trichogaster leeri* (Bleeker).

Eighteen specimens of this lovely little fish, 48 to 65 mm. in length, were taken by cast net from the swamp pools at Ayer Hitam, Johore. In the breeding season the breast of the male is bright red. This is now a common aquarium fish in America.

109. *Trichogaster pectoralis* (Regan).

Fourteen examples were taken from a pond on Singapore Island, their lengths 60 to 126 mm. Dorsal VII or VIII-9; anal X-36 to 38; scales in lateral line 46 to 50; scales in longitudinal series above lateral line, 58 to 65. This species, introduced from Siam, and known as "Sepat Siam", is a valuable food fish now found all over the Peninsula.

110. *Trichogaster trichopterus* (Pallas).

This beautiful species is common in the lowlands everywhere. Of those taken, 50 were retained from ponds on Singapore Island, and 6 from the swamps at Ayer Hitam, Johore, their lengths 16 to 77 mm. Three from Pahang are 15 to 60 mm. in length.

Family NANDIDÆ.

Small to medium sized fresh water fishes, occurring everywhere in the lowlands throughout Malaya.

111. *Nandus nebulosus* Gray.

Four specimens were collected at Gunong Pulai, Johore, one in the Mawai District, Johore, and one at Lake Chin Chin, Jasin, Malacca, their lengths 26 to 58 mm.

112. *Pristolepis fasciatus* (Bleeker).

Two specimens, each 95 mm. long, were taken from a brook on the Mandai Road, Singapore, 8 from 29 to 63 mm. in length at Ayer Hitam, Johore, 3 from 93 to 100 mm. long at Kepak, 25 from 23 to 62 mm. long from the outlet of Lake Chin Chin, near Jasin, Malacca, 2 of 75 and 102 mm. length from Tasek Berah, Pahang, and one of 114 mm. length from Chandra, Dam, Perak.

113. *Pristolepis marginatus* Jerdon.

An example 81 mm. long was obtained from Bukit Merah, Perak.

## Family MASTACEMBELIDÆ.

114. *Macrognathus aculeatus* (Bloch).

Two specimens were obtained on Singapore Island, their lengths 97 and 168 mm.; one from the outlet of Lake Chin Chin, Jasin, Malacca, measures 115 mm., and one from Bukit Merah Reservoir, Perak, is 247 mm. long.

115. *Mastacembelus perakensis* new species. (Plate VII).

Dorsal XXIX-60, completely confluent with the rounded caudal; the last dorsal spine very small, somewhat detached, and almost concealed. Anal III-58, continuous with the caudal but with an inconspicuous notch at the junction; all three anal spines close together, the second one largest and the third very small and inconspicuous.

Snout entirely scaleless, both above and on the sides. No trace of preorbital or preopercular spines. Vent midway between base of caudal fin and vertical limb of preopercle. Mouth not nearly extending to below nostril. Scales small, 32 between origins of soft dorsal and anal fins. No distinct lateral line.

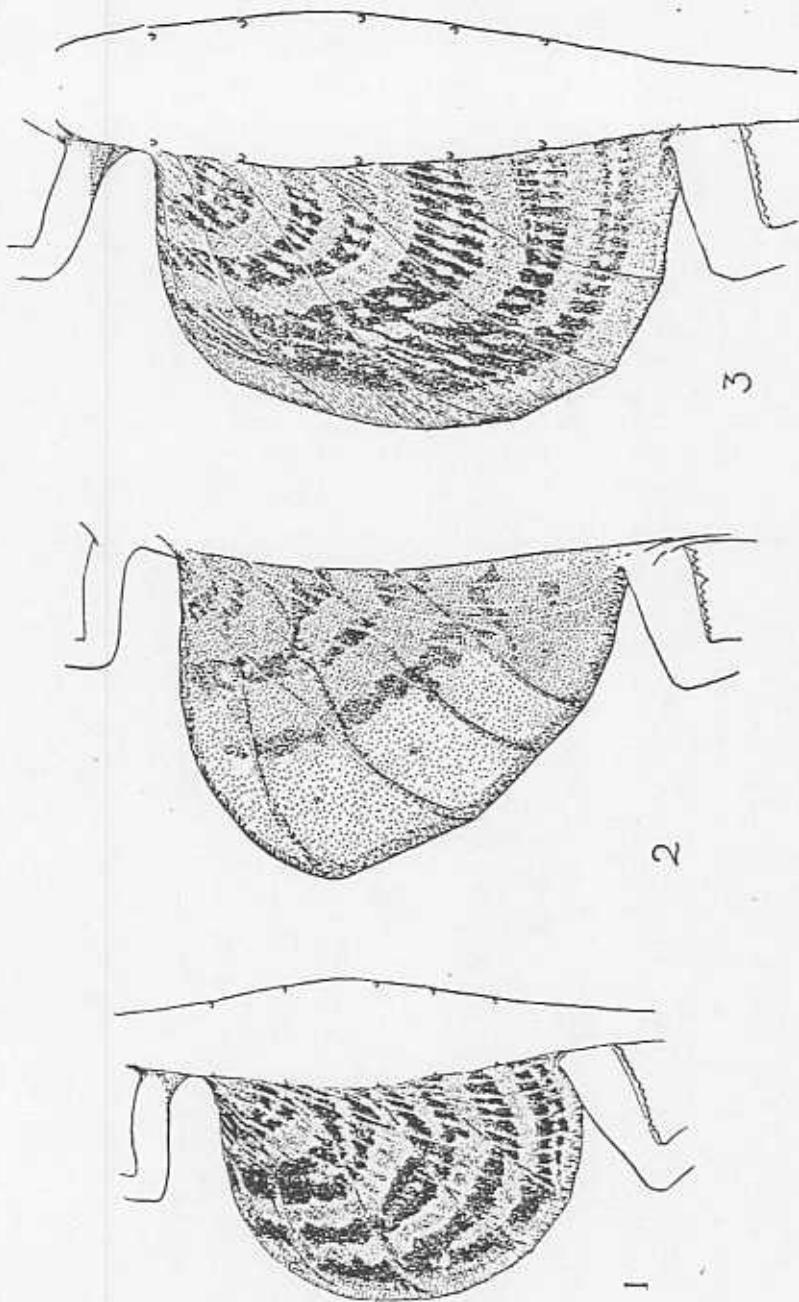
Measurements in millimeters:—Standard length (minus caudal and rostrum) 137; total length (including caudal and rostrum) 151; head (minus rostrum) 20; greatest body depth 16; rostrum 4; snout 6; predorsal length (to base of rostrum) 32; diameter of eye 2; length second anal spine 4.5.

Depth 8.52 times in standard length, head 6.85, predorsal length 4.28, caudal fin 13.7. Eye diameter 10 times in head length, 3 in snout, 2 in rostrum. Snout 3.33 times in head, rostrum 5, second anal spine 4.44. Length of pectoral fin equals snout. Postorbital length of head equals distance from vertical of end of head to base of first dorsal spine.



P. Bravo

*Mastacembelus perakensis* n.sp. (Length of type 137 mm.).



1, *Draco taeniopterus*; 2, *D. formosus*; 3, *D. blanfordi*.

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## DRACO BLANFORDI AND ITS ALLIES

Color in alcohol bluish slate, becoming marbled with yellow on lower and posterior parts. Dorsal and anal fins yellow with black diagonal bands, the margins whitish.

Described from the holotype, from Bukit Merah Reservoir, Krian District, Perak, in the Stanford Museum. A small paratype in the United States National Museum, 44 mm. long, from Singapore Island, has not been utilized in drawing up the above description.

In Boulenger's excellent synopsis of the genus *Mastacembelus* (Journ. Acad. Nat. Sci. Phila., ser. 2, vol. 15, 1912, pp. 197-203), *M. perakensis* belongs in group *B* under section II. In this group it might enter either sub-group 1 or sub-group 2, but the combination of naked snout, 3 anal spines, 29 dorsal spines, and especially the lack of both preorbital (infraorbital) and preopercular spines, separates it trenchantly from all of its possible relatives. None of the species described since 1912 seems at all closely related to *perakensis*.